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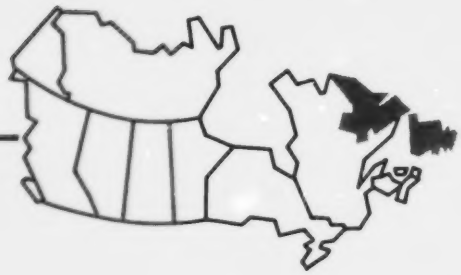
Reference list of diseases of forest trees and shrubs in Newfoundland and Labrador

G.C. Carew



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Newfoundland Forestry Centre

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REFERENCE LIST OF DISEASES OF FOREST TREES AND SHRUBS IN NEWFOUNDLAND AND LABRADOR

by G.C. Carew

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1986

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ABSTRACT

This report provides detailed information on the distribution of recorded diseases and causal agents of forest trees and shrubs occurring in Newfoundland and Labrador. The information was gathered from 37 years of reference material accumulated by the Canadian Forestry Service and the Newfoundland Forest Protection Association. Many samples of the diseases are maintained in the forest pathology herbarium.

RÉSUMÉ

Ce rapport vous fourni de l'information détaillée sur la distribution des maladies connues et des agents néfastes qui se manifestent dans les arbres et arbustes dans la province de Terre-Neuve et du Labrador. Cette information provient de matériel de référence accumulé pendant 37 ans par le Service Canadien de la Forêt et l'Association Protectrice de la Forêt de Terre-Neuve. Plusieurs échantillons d'arbres et arbustes malades sont entretenus dans un herbier réservé aux pathologistes forestiers.

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REFERENCE LIST OF DISEASES OF FOREST TREES AND SHRUBS IN NEWFOUNDLAND AND LABRADOR

by

G.C. Carew

INTRODUCTION

Diseases of trees and shrubs caused by fungi, and other micro-organisms, as well as damage caused by animals and abiotic factors such as snow, ice and frost affect all plant parts including roots, stem and foliage. Diseases may kill or disfigure trees and cause a loss in net merchantable volume or destroy their aesthetic value. During the past five decades, the Canadian Forestry Service and the Newfoundland Forest Protection Association have accumulated considerable information on the distribution of most of the diseases of forest trees and shrubs occurring on the Island. There are some herbaceous plants listed in this report because they are alternate hosts to some of the diseases. To date a total of over 4000 records of diseases and injuries or damage have been made. These records include 114 host species and 209 species of fungi, one phanerogamic parasite (dwarf mistletoe), five animals (moose, snow-shoe hare, goat, squirrel, horse) and numerous records of frost, snow and ice, winter drying, frost heaving, heat injury, late spring leaf scorch, weather damage, wind damage, chemicals, salt, excessive water, lichens, physical injury, roadside damage and unknown factors. The above diseases are arranged in three indices: disease index, host index and general index. Instructions for the use of these indices and information pertaining to their contents are provided as a preface to each index. Representative samples of most of these diseases are deposited in the Newfoundland Forestry Centre Mycological Herbarium (Singh 1969; Singh and Carew 1971; Singh and Carew 1973; Singh 1974).[1]

This report provides a readily accessible inventory of the recorded diseases and injuries of forest trees and shrubs in Newfoundland and Labrador. It also contains maps showing their distribution and a list of published and unpublished reports for more detailed information.

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[1]Singh, Pritam. 1969. A list of specimens deposited in the Mycological Herbarium of the Forest Research Laboratory, St. John's, Newfoundland. Inform. Rept. N-X-31. 72 p.

Singh, Pritam and G.C. Carew. 1971. A supplement to the list of specimens deposited in the Mycological Herbarium of the Forest Research Laboratory, St. John's, Newfoundland. Inform. Rept. N-X-62. 53 p.

Singh, Pritam and G.C. Carew. 1973. Reference list of diseases of forest trees and shrubs in Newfoundland. Inform. Rept. N-X-87. 100 p.

Singh, Pritam. 1974. A list of specimens deposited in the Mycological Herbarium of the Newfoundland Forest Research Centre, St. John's, Newfoundland. Inform. Rept. N-X-123. 109 p.

PREFACE TO DISEASE INDEX

In this index, the diseases, including all types of abiotic damage, are classified into groups on the basis of the most common name of the disease or the damage, or major symptoms on the affected plant part. Examples of the groups are root and butt rots, stem rots of heartwood, stem rots of sapwood, stem cankers, needle rusts, leaf spots, animal and frost damage. The pathogens and other causal agents are grouped alphabetically under their appropriate groups. In addition, common name of the disease and scientific name of the host or hosts are provided for each causal agent. The numbers outside parenthesis under each host indicate the position on the maps (Figs. 1 to 22) and refer to the names of localities (Appendix I and II); latitudes and longitudes of 331 of the localities are given in Appendix I. The numbers within parenthesis indicate the publication in which the disease or the damage was reported (Appendix III).

DISEASE INDEX
INFECTIOUS DISEASES

Root and Butt Rots

Pathogen	Disease	Host
Armillaria mellea (Vahl ex Fr.) Kummer	Armillaria or shoe-string root rot	Abies balsamea (L.) Mill. 1, 2, 3, 4. 5, 7, 8, 9, 10, 12, 13, 17, 18, 19, 24, 27, 37, 52, 56, 72, 84, 89, 92, 95, 109, 120, 124, 125, 149, 165, 166, 167, 168, 169, 170, 175, 295, 296, 308, 583, 584, 585, 591, 592, 627 (1, 2, 3, 8, 9, 14, 16, 17, 18, 19, 21, 43, 45, 46, 47, 48, 49, 51, 69, 70, 75, 78, 80, 81, 83, 84, 85, 87, 91, 97, 99, 100, 101, 102, 103, 104, 111, 135, 147, 158, 160, 162). Abies holophylla Maxim 5, 8, 9, 583 (14, 41, 43, 100, 103, 111, 113, 150, 162, 165). Abies homolepis Sieb. and Zucc. 5, 8, 9, 583 (14, 41, 100, 103, 111, 150, 162, 165). Abies mariesii Mast. 5, 8, 9, 583 (14, 41, 100, 103, 111, 150, 162, 165). Abies mayriana Myiabe and Kudo 5, 8, 9, 583 (14, 41, 100, 103, 111, 150, 162, 165). Abies sachalinensis Mast. 5, 8, 9, 583 (14, 41, 100, 103, 111, 150, 162, 165). Abies species 583, 584, 585 (12).

Pathogen	Disease	Host
Armillaria mellea (Vahl ex Fr.) Kummer (Cont'd.)		Abies veitchii Lindl. 5, 8, 9, 583 (14, 41, 100, 103, 111, 113, 150, 162, 165). Betula papyrifera Marsh. 11, 16, 250 (71, 150). Larix laricina (Du Roi) K. Koch 6, 17, 583, 584, 585 (16, 18, 45, 48, 78, 80, 83, 84, 85, 150, 160). Larix leptolepis (Sieb. and Zucc.) Gord. 6, 583 (15, 43, 44, 98, 100, 150, 154, 161, 165). Picea abies (L.) Karst. 1, 4, 6, 7, 583 (14, 15, 44, 98, 100, 103, 150, 154, 155, 158, 160, 161, 163, 165, 166). Picea glauca (Moench) Voss 6, 7, 9, 10, 37, 120, 167, 168, 583, 584, 585 (11, 12, 14, 15, 18, 43, 44, 48, 84, 98, 100, 103, 108, 113, 150, 154, 158, 160, 163, 165). Picea mariana (Mill.) B.S.P. 2, 6, 7, 9, 12, 13, 14, 15, 16, 17, 24, 26, 37, 95, 113, 120, 122, 149, 157, 167, 168, 171, 172, 173, 174, 175, 196, 237, 295, 296, 308, 583, 584, 585, 591, 592, 593, 627 (1, 2, 4, 5, 8, 9, 11, 12, 14, 16, 18, 19, 20, 23, 24, 25, 32, 45, 48, 49, 50, 53, 56, 57, 58, 68, 70, 75, 78, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 100, 104, 108, 113, 150, 153, 160, 161, 163, 165, 167, 171, 172).

Pathogen	Disease	Host
Armillaria mellea (Vahl ex Fr.) Kummer (Concl'd.)		Picea rubens Sarg. 4, 7, 583 (14, 100, 103, 150, 165).
		Picea sitchensis (Bong.) Carr. 1, 4, 6, 7, 157, 196, 583, 584, 585 (5, 8, 9, 11, 12, 14, 15, 41, 43, 44, 69, 75, 80, 81, 98, 100, 103, 108, 113, 150, 153, 154, 155, 158, 160, 161, 163, 165, 166).
		Picea sitchensis x glauca 6 (44, 98, 154).
		Picea species 14, 26, 582, 584, 585 (12, 21, 23, 51).
		Pinus resinosa Ait. 1, 583 (14, 100, 103, 150, 155, 165).
		Pinus strobus L. 16 (150).
		Pinus sylvestris L. 22, 584 (4, 69, 72).
		Prunus pensylvanica L.f. 250 (71).
		Pseudotsuga menziesii (Mirb.) Franco (= Pseudotsuga taxifolia (Poir.) Britton) 6, 583 (15, 44, 98, 100, 150, 154, 158, 165).
Coniophora puteana (Schum. ex Fr.) Karst.	Brown cubical root and butt rot	Abies balsamea (L.) Mill. 4, 77, 583, 592 (30, 46, 97).
		Salix species

Pathogen	Disease	Host
Odontia bicolor (A. and S.) Bres.	White stringy butt rot	Abies balsamea (L.) Mill. 4, 583 (46, 97).
Polyporus balsameus Pk.	Brown cubical butt rot	Abies balsamea (L.) Mill. 4, 583, 584, 585 (10, 40, 97, 117).
Polyporus schweinitzii Fr.	Brown or red brown cubical butt rot	Picea glauca (Moench) Voss 153.
		Picea mariana (Mill.) B.S.P.
Polyporus tomentosus Fr. (= Polyporus circinatus auct. non Fr.)	Red root and butt rot or white pocket rot of conifers	Picea glauca (Moench) Voss 158, 582 (62, 95).
		Picea mariana (Mill.) B.S.P. 582 (9, 39, 95).
Polyporus tomentosus var. circinatus (Fr.) Sartory and Maire	Red butt rot	Pinus strobus L. 82 (82).

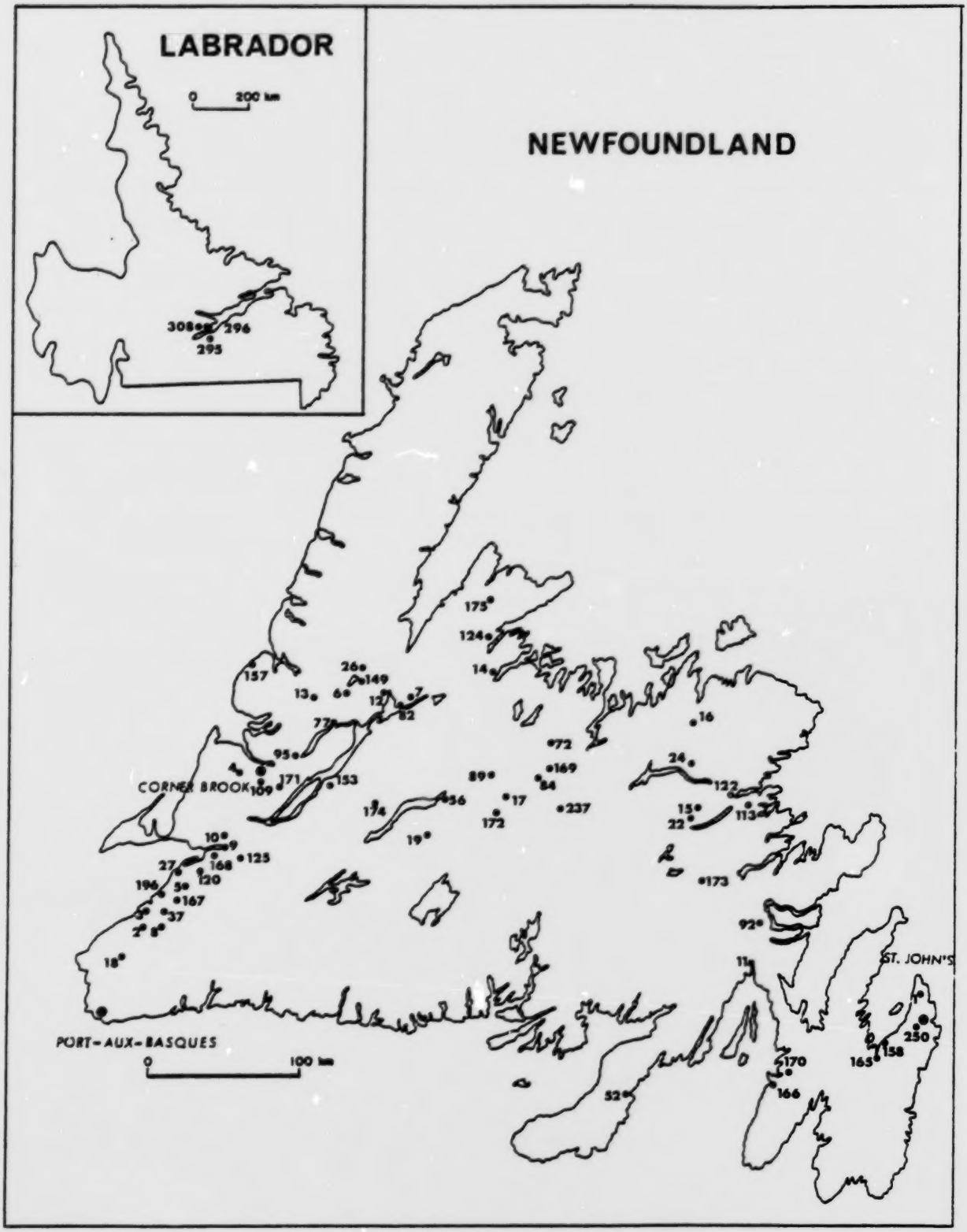

Fig. 1. Map showing 60 locations where root and butt rots were collected.

Stem Rots of Heartwood

Pathogen	Disease	Host
Corticium galactinum (Fr.) Burt	White or yellow stringy root and butt rot	Abies balsamea (L.) Mill. 4 (97). Picea species
Daedalea unicolor Bull. ex Fr.	White spongy rot or canker rot	Betula papyrifera Marsh. 159.
Fomes fomentarius (L. ex Fr.) Kickx	White mottled rot of heartwood and sapwood	Betula alleghaniensis Britt. 4, 18 (92, 94). Betula papyrifera Marsh. 4, 10, 57, 94 (94). Prunus pensylvanica L.f. 14 (88).
Fomes igniarius (L. ex Fr.) Kickx	White stringy or spongy heart rot	Betula alleghaniensis Britt. 109, 110, 151 (29). Betula papyrifera Marsh. 109, 110, 156, 175, 584 (14, 15, 29, 82, 104). Populus tremuloides Michx. 56, 77, 93, 96 (20, 50, 86). Salix species 24, 109, 110 (29).
Fomes igniarius var. laevigatus (Fr.) Overh.	White spongy rot	Populus balsamifera L. 502 (36, 94).
Fomes pini (Brot. ex Fr.) Karst.	Red ring rot or white pocket rot of conifers	Abies balsamea (L.) Mill. 14, 19, 64, 77, 86, 87, 92, 110, 116, 119, 121, 501, 583, 584, 585 (9, 10, 30, 39, 95, 104, 117).

Pathogen	Disease	Host
Fomes pini (Brot. ex Fr.) Karst. (Concl'd.)		Picea glauca (Moench) Voss 14, 19, 64, 77, 86, 87, 92, 110, 116, 119, 121, 501, 583, 584, 585 (9, 10, 30, 39, 40, 95). Picea mariana (Mill.) B.S.P. 14, 19, 20, 64, 77, 86, 87, 92, 110, 116, 119, 121, 156, 501, 583, 584, 585 (30, 95, 104). Picea species 94 (30).
Fomes pinicola (Sw. ex Fr.) Cke.	Brown cubical rot of heartwood and sapwood	Abies balsamea (L.) Mill. 4, 37, 148, 151 (102). Betula papyrifera Marsh. 18, 57 (92). Picea glauca (Moench) Voss 4 (94). Picea mariana (Mill.) B.S.P. 57, 156.
Fomes robustus Karst.	White spongy heart rot and occasional sap rot	Betula papyrifera Marsh.
Fomes species	Heart rot	Betula papyrifera Marsh. Picea mariana (Mill.) B.S.P.
Ganoderma applanatum (Pers. ex Wallr.) Pat.	White mottled rot	Betula papyrifera Marsh. 133. Picea mariana (Mill.) B.S.P. Populus balsamifera L.
Lenzites saepiaria (Wulf. ex Fr.) Fr.	Brown cubical or pocket rot	Abies balsamea (L.) Mill. 9, 77, 148 (30, 31, 81). Picea mariana (Mill.) B.S.P. 20, 57 (82, 104). Picea species 19, 149.

Pathogen	Disease	Host
Lenzites species	Brown cubical rot	Abies balsamea (L.) Mill.
		Picea mariana (Mill.) B.S.P.
Peniophora polygonia (Pers. ex Fr.) Bourd. and Galz.	White spongy rot	Populus species 90.
		Populus tremuloides Michx. 77, 93 (36).
Peniophora septentrionalis Laurila	Red heart rot	Picea mariana (Mill.) B.S.P. 160.
Polyporus borealis Fr.	White mottled rot of conifers	Picea species 153.
Stereum sanguinolentum (Alb. and Schw. ex Fr.) Fr.	Red heart rot	Abies balsamea (L.) Mill. 4, 57, 77, 110, 157, 172, 583 (9, 10, 30, 31, 39, 40, 46, 97, 99, 117).
		Picea species 20, 77.

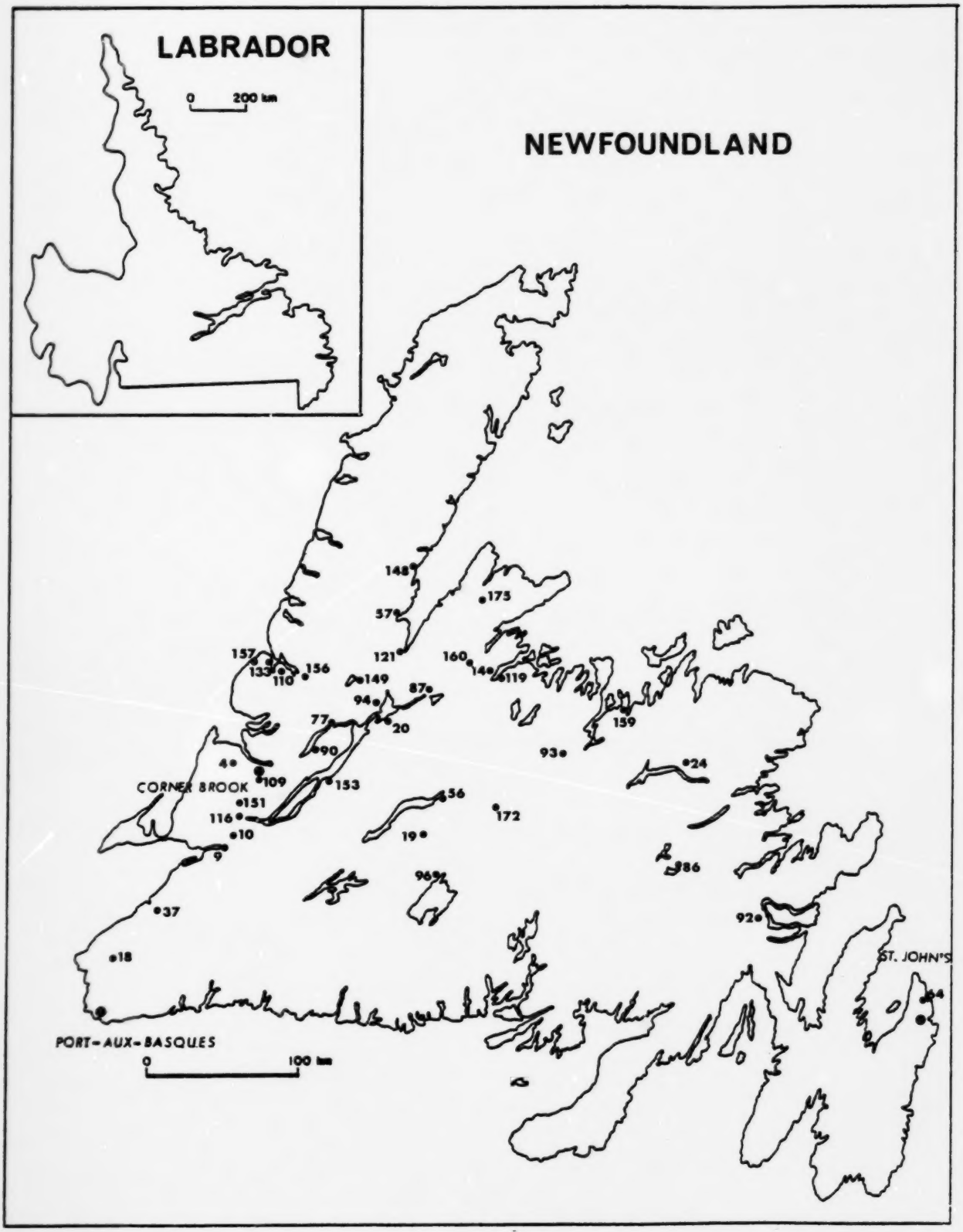

Fig. 2. Map showing 36 locations where stem rots of heartwood were collected.

Stem Rots of Sapwood

Pathogen	Disease	Host
Ceratocystis species	Sapwood stain	*Abies balsamea* (L.) Mill. 4, 37, 124 (102).
Daedalea confragosa Bolt. ex Fr.	White spongy sap rot	*Sorbus decora* (Sarg.) Schneid.
Daedalea species	Sap rot	*Abies balsamea* (L.) Mill. 164.
Daedalea unicolor Bull. ex Fr.	White spongy rot or canker rot	*Betula papyrifera* Marsh. 159.
Fomes fomentarius (L. ex Fr.) Kickx	White mottled rot of heartwood and sapwood	*Betula alleghaniensis* Britt. 4, 18 (92, 94).
		Betula papyrifera Marsh. 4, 10, 57, 94 (94).
		Prunus pensylvanica L.f. 14 (88).
Fomes pinicola (Sw. ex Fr.) Cke.	Brown cubical rot of heartwood and sapwood	*Abies balsamea* (L.) Mill. 4, 37, 148, 151 (102).
		Betula papyrifera Marsh. 18, 57 (92).
		Picea glauca (Moench)Voss 4 (94).
		Picea mariana (Mill.) B.S.P. 57, 156.
Fomes species	Heart rot	*Betula papyrifera* Marsh.
		Picea mariana (Mill.) B.S.P.
Ganoderma applanatum (Pers. ex Wallr.) Pat.	White mottled rot	*Betula papyrifera* Marsh. 133.
		Picea mariana (Mill.) B.S.P.
		Populus balsamifera L.

Pathogen	Disease	Host
Lenzites saepiaria (Wulf. ex Fr.) Fr.	Brown cubical or pocket sap rot	Abies balsamea (L.) Mill. 9, 77, 148 (30, 31, 81).
		Picea mariana (Mill.) B.S.P. 20, 57 (82, 104).
		Picea species 19, 149.
Lenzites species	Brown cubical rot	Abies balsamea (L.) Mill.
		Picea mariana (Mill.) B.S.P.
Peniophora gigantea (Fr.) Massee	White sap rot	Picea species 94.
Pleurotus species	White flaky rot	Aesculus hippocastanum L. 25 (72).
Polyporus abietinus Dicks. ex Fr.	White pocket rot or pitted sap rot of conifers	Abies balsamea (L.) Mill. 4, 37, 77, 94, 124, 149, 163, 583 (30, 46, 102).
		Picea mariana (Mill.) B.S.P. 20.
		Picea species 19, 94, 133, 149.
Polyporus adustus Willd. ex Fr.	White mottled rot	Picea mariana (Mill.) B.S.P.
		Populus species 77.
		Populus tremuloides Michx. 162.
Polyporus albellus Pk.	White spongy rot	Alnus species 119.
		Betula alleghaniensis Britt. 151.

Pathogen	Disease	Host
Polyporus albellus Pk. (Concl'd.)		Betula papyrifera Marsh. 84.
		Prunus pensylvanica L.f. 150.
Polyporus arcularis Batsch ex Fr.	White rot of broadleaved trees	Betula papyrifera Marsh. 152.
Polyporus betulinus Bull. ex Fr.	Brown cubical sap rot	Betula papyrifera Marsh. 19, 94, 127, 155, 177, 584 (15, 84, 90).
Polyporus biformis Klotsch ex Fr.	Yellowish rot	Abies balsamea (L.) Mill. 162.
Polyporus brumalis Pers. ex Fr.	White rot of broadleaved trees	Betula papyrifera Marsh. 154.
		Populus tremuloides Michx. 162.
		Prunus pensylvanica L.f. 152.
Polyporus elegans Bull. ex Fr.	White rot	Populus species 84, 119.
		Salix species 24.
Polyporus fibrillosus Karst.	Brown rot of conifers	Picea species 151.
Polyporus hirsutus Wulf. ex Fr.	White spongy rot of sapwood of broadleaved trees; rarely on coniferous trees	Populus tremuloides Michx. 19, 160 (30).

Pathogen	Disease	Host
Polyporus mollis Pers. ex Fr.	Brown rot of coniferous trees	Abies balsamea (L.) Mill. 151.
Polyporus nidulans Fr.	White sap rot	Salix species 39.
Polyporus pargamenus Fr.	White spongy or white pocket sap rot	Betula papyrifera Marsh. Populus species 94. Populus tremuloides Michx. 51, 123.
Polyporus pubescens Schum. ex Fr.	White spongy sap rot of broadleaved trees	Betula papyrifera Marsh. 109. Betula species 126.
Polyporus semipileatus Pk.	White rot	Picea species 119.
Polyporus species	Sapwood rot	Abies balsamea (L.) Mill. 172 (92). Picea mariana (Mill.) B.S.P. Pinus strobus L.
Polyporus velutinus Fr.	White spongy rot of broadleaved trees	Betula papyrifera Marsh. 161. Populus tremuloides Michx. 7, 162.
Polyporus versicolor L. ex Fr.	Soft white spongy rot of broadleaved trees	Alnus rugosa (Du Roi) Spreng. Betula papyrifera Marsh. 9 (81).

Pathogen	Disease	Host
Polyporus versicolor L. ex Fr. (Concl'd.)		Betula species 6.
		Populus species 94.
		Prunus pensylvanica L.f. 109.
Pycnoporus cinnabarinus (Jacq. ex Fr.) Karst. (= Polyporus cinnabarinus Jacq. ex Fr.)	White rot of broadleaved trees	Betula papyrifera Marsh. 151.
		Betula species 6 (30).
		Sorbus species 156.
Schizophyllum commune Fr.	White spongy sap rot	Abies balsamea (L.) Mill. 77, 95 (30).
		Alnus rugosa var. americana (Regel) Fern.
		Betula papyrifera Marsh.
		Populus species
		Populus tremuloides Michx.
Stereum hirsutum (Willd. ex Fr.) S.F. Gray	White sap rot	Betula papyrifera Marsh. 7, 160.
		Prunus pensylvanica L.f.
Trametes species	Stem decay	Abies balsamea (L.) Mill. 9 (81).

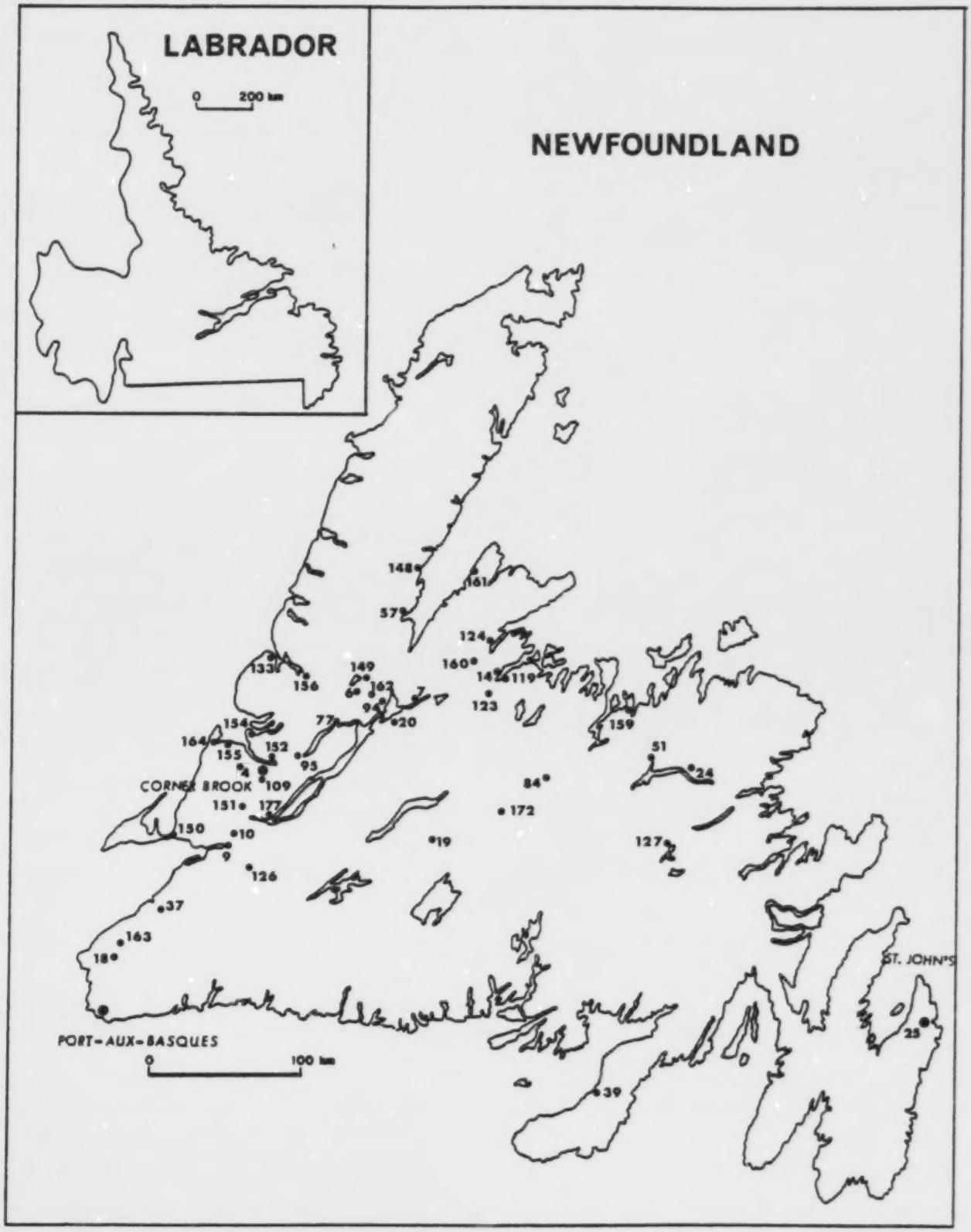

Fig. 3. Map showing 42 locations where stem rots of sapwood were collected.

Stem Rots - Miscellaneous

Pathogen	Disease	Host
Alternaria tenuis auct. sensu. Wiltshire	Sapwood stain	Abies balsamea (L.) Mill. 583, 584, 585 (99).
Cephalosporium species	Sapwood stain	Abies balsamea (L.) Mill. 583, 584, 585 (99).
Coriolellus heteromorphus (Fr.) Bond. and Singer	Brown cubical rot of conifers	Abies balsamea (L.) Mill.
Coriolellus species (? heteromorphus or variiformis)	Brown cubical rot	Abies balsamea (L.) Mill.
Coriolellus variiformis (Pk.) Sarkar	Light brown cubical rot	Picea mariana (Mill.) B.S.P.
Corticium galactinum (Fr.) Burt	White and yellow stringy root and butt rot	Abies balsamea (L.) Mill. 4 (97). Coniferous wood Picea species
Corticium laeve Pers. ex Fr.	White spongy rot	Picea species 24.
Corticium leucoxanthum Bres.		Alnus species 7.
Corticium notabile Jackson	Decay of wood and bark	Picea mariana (Mill.) B.S.P. 7.
Corticium pelliculare Karst.		Picea species 119.
Corticium pini-canadensis (Schw.) Jacks. and Rogers	Stem decay of old wood and bark	Abies balsamea (L.) Mill. 90.

Pathogen	Disease	Host
Corticium sulphureum (Pers. ex Fr.) Fr.	Decay	Coniferous wood and slash 160.
Kirschsteiniella thujina (Pk.) Pomerleau and Etheridge (= Amphisphaeria thujina (Pk.) Sacc.)	Blue stain of the sapwood	Abies balsamea (L.) Mill. 4, 37, 124, 583, 584, 585 (99, 102).
Panus laevis Berk. and Curt.		Betula papyrifera Marsh.
Panus stipticus (Bull. ex Fr.) Fr.	Decay of logs	Alnus species Betula papyrifera Marsh. Populus tremuloides Michx.
Peniophora aspera (Pers.) Sacc.	Decay of logs and dead wood	Betula papyrifera Marsh. 77. Prunus species 35.
Peniophora aurantiaca (Bres.) Höhn. and Litsch.	White rot	Alnus rugosa (Du Roi) Spreng. 20. Alnus rugosa var. americana (Regel) Fern. 172 (92). Alnus species 119.
Peniophora populnea (Pk.) Burt		Populus tremuloides Michx. 147.
Peniophora rufa (Fr.) Boid. (= Stereum rufum Fr.)		Populus tremuloides Michx. 84, 160, 574 (30).

Pathogen	Disease	Host
Peniophora separans Burt	Decay	Picea species 148.
Peniophora species	Decay	Alnus crispa (Ait.) Pursh
		Alnus rugosa (Du Roi) Spreng.
		Betula papyrifera Marsh.
		Populus tremuloides Michx.
Phlebia strigosozonata (Schw.) Lloyd	White spongy rot	Populus species
Polyporus pocula (Schw.) Berk. and Curt.		Prunus pensylvanica L.f. 109.
Poria candidissima (Schw.) Cke.	White rot	Abies balsamea (L.) Mill. 148.
		Picea mariana (Mill.) B.S.P. 20.
Poria ferrea (Pers.) Bourd. and Galz.	White rot	Alnus species 93.
		Sorbus americana Marsh 160.
Poria prunicola (Murr.) Sacc. and Trott.	Associated with white rot	Prunus species 160.
Poria species	Decay	Alnus species
		Picea glauca (Moench) Voss
		Picea mariana (Mill.) B.S.P.
		Populus tremuloides Michx.

Pathogen	Disease	Host
Stereum chailletii (Pers. ex Fr.) Fr. (= Amylostereum chailletii (Pers. ex Fr.) Boid.)	White stringy rot	Abies balsamea (L.) Mill. 4, 37, 77, 84, 89, 90, 95, 124, 125, 126, 583 (21, 30, 31, 43, 46, 51, 99, 101, 102).
Stereum ochraceoflavum (Schw.) Ell.		Alnus species
Stereum ostrea Blume and Nees ex Fr.	White crumbly rot	Betula papyrifera Marsh. 94.
Stereum purpureum (Pers. ex Fr.) Fr.	Silver leaf	Betula papyrifera Marsh. 24, 77, 109 (93).
		Populus species
		Populus tremuloides Michx. 160 (30).
Stereum rugosum Fr.		Alnus species 133.
		Betula papyrifera Marsh. 24, 57, 77.
Stereum species	Brown streaks	Abies balsamea (L.) Mill. 84 (87).
Trechispora brinkmanni (Bres.) Rogers and Jacks. (= ? Sistotrema brinkmanni (Bres.) John Erikss.)	White stringy rot	Populus tremuloides Michx.

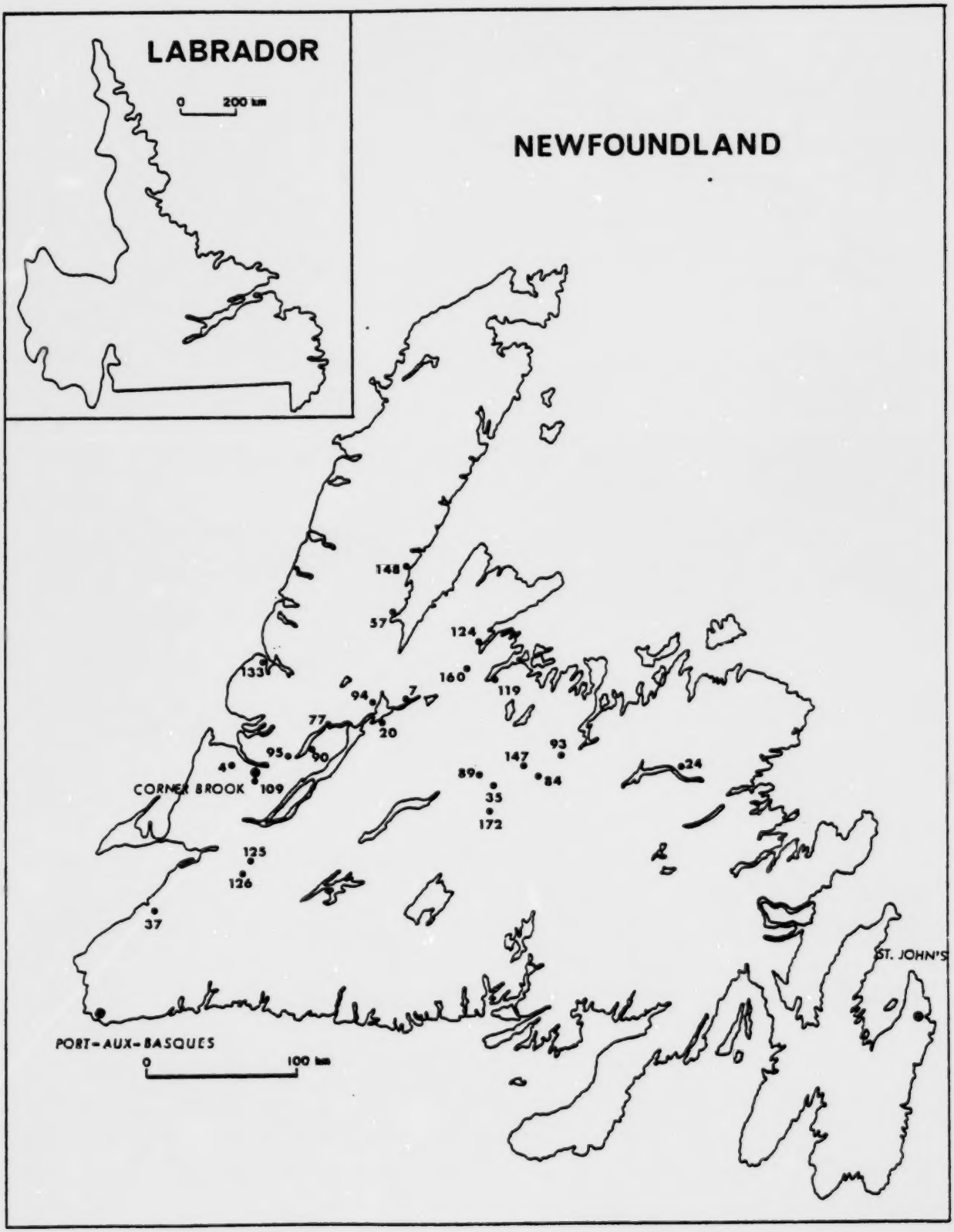

Fig. 4. Map showing 24 locations where miscellaneous stem rots were collected.

Stem Cankers

Pathogen	Disease	Host
Aleurodiscus amorphus (Pers. ex Fr.) Schroet.	Canker	Abies balsamea (L.) Mill.
Creonectria cucurbitula (Sacc.) Seav. (= Nectria cucurbitula Sacc.)	Canker	Abies balsamea (L.) Mill. 77 (30).
Cytospora chrysosperma (Pers.) Fr.	Stem and branch canker	Populus balsamifera L. 272 (73).
		Populus nigra var. italica Muenchh. 25, 68, 77, 84, 93, 109, 595 (7, 36).
		Populus species 25, 77, 84, 109, 251, 595 (76).
		Populus tremuloides Michx. 84, 90, 249, 250, 584 (5, 6, 36).
		Prunus pensylvanica L.f. 25, 84, 249, 250 (6).
		Salix species 98, 291 (104).
Cytospora kunzei Sacc.	Canker	Picea pungens Engelm. 25 (7).
Cytospora salicis (Cda.) Rabh.	Associated with dieback	Salix discolor Muhl. 14, 84, 101, 272, 582 (5, 8, 75).
		Salix species 6, 14, 38, 51, 84, 98, 101, 109, 272, 291, 308, 582, 583, 584 (5, 6, 36, 71, 72, 73, 73A, 91, 125, 134).

Pathogen	Disease	Host
Cytospora species	Dieback and canker	Acer rubrum L. Acer spicatum Lam. 90 (5, 132). Alnus rugosa (Du Roi) Spreng. Populus balsamifera L. 250 (72). Salix babylonica L. 25, 98, 109, 325, 545, 604 (6, 72, 73A, 132).
Dothichiza populea Sacc. and Briard	Stem and branch canker	Populus nigra var. italica Muenchh. 24, 25, 64, 68, 77, 84, 94, 109, 128, 180, 231, 250, 260, 266, 318, 319, 320, 321, 583, 584, 585, 595 (1, 2, 4, 5, 6, 7, 33, 34, 35, 36, 37, 69, 70, 71, 72, 73, 73A, 74, 104, 122, 123, 125, 126, 127, 128, 131, 132, 134, 135, 137, 138, 139, 167, 169).
Encoelia fascicularis fide Groves	Canker	Populus tremuloides Michx. 160 (30).
Gremmeniella abietina (Lagerb.) Morelet (= Scleroderris lagerbergii Gremmen)	Stem and branch canker	Pinus banksiana Lamb. 25, 78, 199, 301 (32, 68, 143, 144). Pinus nigra Arn. 1, 25, 78, 301 (4, 33, 69, 70, 71, 135, 137, 138, 139, 143, 145, 148, 169, 172). Pinus resinosa Ait. 1, 25, 78, 199, 250 (1, 2, 32, 33, 68, 69, 70, 138, 139, 143, 144).

Pathogen	Disease	Host
Gremmeniella abietina (Lagerb.) Morelet (Concl'd.)		Pinus sylvestris L. 1, 25, 78, 199, 250, 301, 316 (32, 33, 68, 69, 70, 139, 143, 144, 169).
Hymenochaete tabacina (Sow. ex Fr.) Lév.	Canker and rot	Abies balsamea (L.) Mill.
		Acer spicatum Lam.
		Alnus rugosa var. americana (Regel) Fern. 503 (94).
		Alnus species
		Betula papyrifera Marsh.
		Picea species
		Populus tremuloides Michx. 123 (93).
		Prunus species 160 (30).
		Salix species
Hypoxylon fuscum Pers. ex Fr.	Canker	Alnus rugosa (Du Roi) Spreng. 7 (30).
Hypoxylon mammatum (Wahl.) Miller (= Hypoxylon blakei Berk. and Curt.) (= Hypoxylon morsei Berk. and Curt.)	Stem canker	Alnus rugosa (Du Roi) Spreng. 7, 17, 101 (30).
		Alnus species 20.
		Salix species 90 (30).
Hypoxylon multiforme Fr.	Stem canker	Acer spicatum Lam. 90, 109 (5).

Pathogen	Disease	Host
Hypoxylon multiforme Fr. (Concl'd.)		Betula alleghaniensis Britt. 163.
		Betula papyrifera Marsh. 133.
		Sorbus species 90.
Nectria cinnabarina Tode ex Fr.	Dieback and coral spot (canker)	Acer pseudoplatanus L. 25 (69, 70).
		Acer rubrum L. 109, 583, 584, 585 (18).
		Acer saccharinum L.
		Acer saccharum Marsh. 25 (70).
		Acer species 109 (19, 85).
		Acer spicatum Lam. 583, 584, 585.
		Aesculus hippocastanum L. 583, 584, 585.
		Laburnum anaguiroides Medic. 583, 584, 585.
		Prunus pensylvanica L.f. 25.
		Rosa species 25 (69).
		Sambucus pubens Michx.
		Sambucus species 583, 584, 585.
		Sorbus decora (Sarg.) Schneid.

Pathogen	Disease	Host
Nectria cinnabarina Tode ex Fr. (Concl'd.)		Tilia species 583, 584, 585.
		Ulmus parvifolia Jacq. 109 (18, 19, 20, 21, 22, 51, 53, 85, 86).
Nectria coccinea (Pers. ex Fr.) Fr.	A saprobe associated with canker	Alnus crispa (Ait.) Pursh.
		Taxus brevifolia Nutt. 25, 251, 595 (7).
Nectria galligena Bres.	Canker	Acer pseudoplatanus L. 25, 251, 595 (7, 37, 73A, 129).
Nectria species	Canker	Abies balsamea (L.) Mill.
		Acer rubrum L. 25.
		Acer saccharinum L. 25.
		Acer spicatum Lam. 25.
		Aesculus hippocastanum L. 25.
		Fagus species
		Picea pungens Engelm. 25 (7).
Retinocyclus abietis (Crouan) Groves and Wells	Dieback and canker	Abies balsamea (L.) Mill. 583, 584, 585 (99).
Tympanis pithya (Fr.) Karst.	Canker	Pinus strobus L.
Tympanis spermatiospora (Nyl.) Nyl.	Canker	Populus species 22, 90 (30).
		Populus tremuloides Michx.
		Prunus species 7 (30).

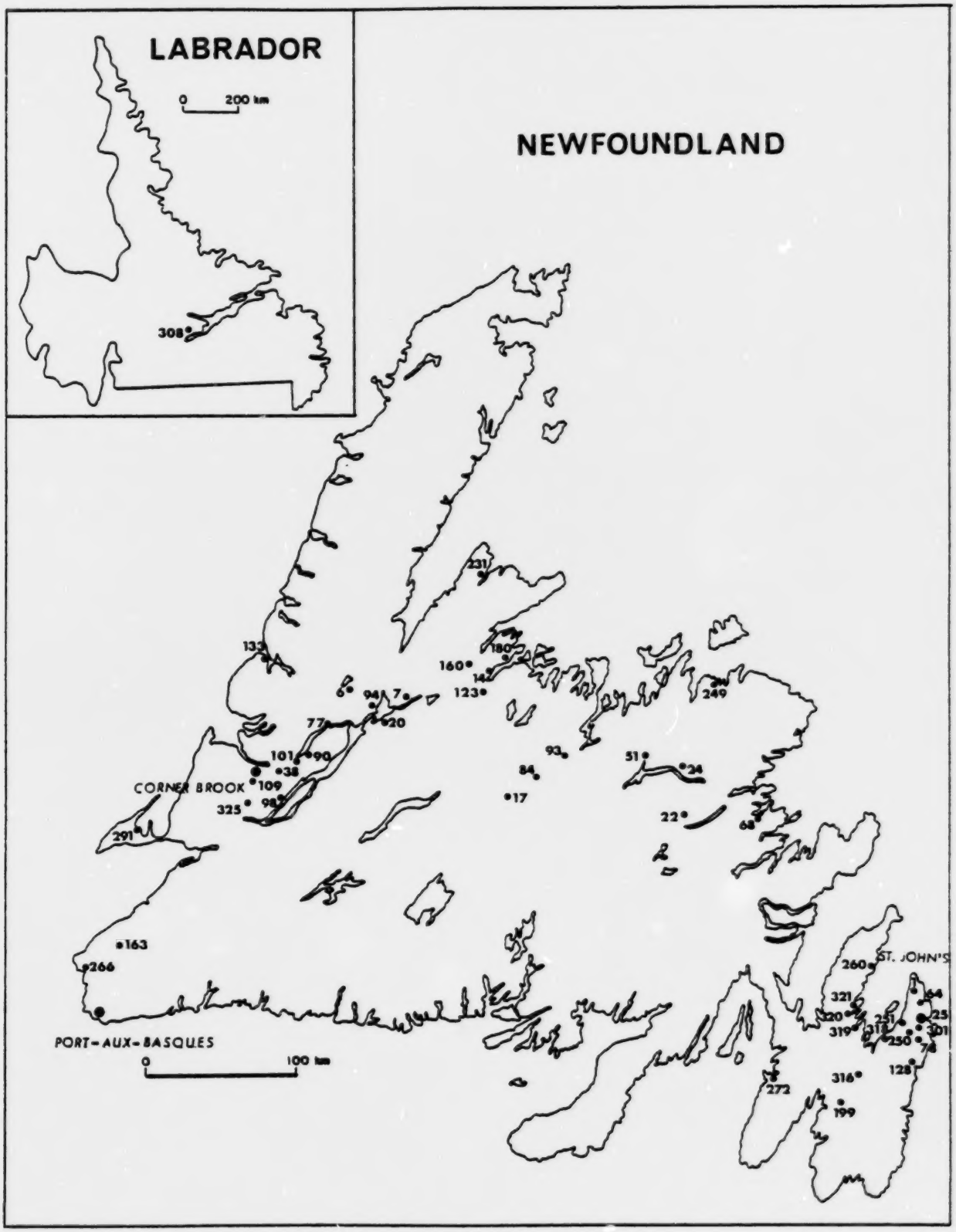

Fig. 5. Map showing 45 locations where stem cankers were collected.

Stem Rusts

Pathogen	Disease	Host
Chrysomyxa arctostaphyli Diet. (= Peridermium coloradense (Diet.) Arth. and Kern)	Yellow witches' broom	Picea glauca (Moench) Voss 35, 39, 54 (22). Picea mariana (Mill.) B.S.P. 14, 24, 35, 39, 53, 54, 89, 92, 122, 155, 199, 296, 308, 313, 580, 581, 582, 583, 584, 585, 619, 627 (1, 4, 5, 6, 18, 33, 35, 36, 37, 53, 68, 69, 70, 72, 73, 73A, 82, 84, 85, 86, 88, 89, 105, 123, 124, 125, 127, 128, 131, 132, 134, 143, 159, 167).
Cronartium coleosporioides Arth.	Blister rust	Pinus banksiana Lamb. 265 (8, 75).
Cronartium ribicola J.C. Fischer	Blister or stem rust of eastern white pine	Pinus strobus L. 7, 9, 10, 12, 19, 20, 21, 22, 23, 24, 25, 26, 35, 38, 55, 67, 84, 86, 87,90, 93, 110, 113, 121, 122, 131, 151, 162, 172, 180, 181, 182, 183, 251, 290, 507, 508, 559, 583, 584, 585, 589, 590, 591, 592, 602 (1, 2, 4, 5, 6, 8, 9, 13, 14, 15, 16, 17, 18, 19, 20, 23, 24, 30, 43, 44, 56, 57, 65, 66, 67, 69, 70, 71, 73A, 75, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 92, 94, 95, 104, 134, 139, 169, 172). Ribes glandulosum Grauer (alternate host) 9, 10. 303 (6, 8, 9, 72, 75). Ribes hirtellum Michx. (alternate host) Ribes lacustre (Pers.) Poir. (alternate host) 583, 584, 585.

Pathogen	Disease	Host
Cronartium ribicola J.C. Fischer (Concl'd.)		Ribes species 4, 13, 77, 90, 121, 149, 156, 583, 584, 585 (30, 65).
Gymnosporangium clavipes (Cke. and Pk.) Cke. and Pk.	Quince rust	Amelanchier species 11, 25, 56, 260, 596 (5, 73, 73A, 136, 149).
		Juniperus communis L. 11, 25, 260 (136, 149).
Gymnosporangium species	Stem rust	Amelanchier bartramiana (Tausch) Roem.
		Amelanchier laevis Wieg.
		Amelanchier sanguinea (Pursh) D.C.
Melampsorella caryophyllacearum Schroet. (= Melampsorella cerastii Schroet.)	Yellow witches' broom	Abies balsamea (L.) Mill. 6, 24, 25, 27, 34, 35, 39, 47, 52, 54, 63, 67, 79, 84, 96, 101, 107, 109, 113, 149, 178, 179, 183, 197, 199, 223, 249, 296, 300, 307, 309, 504, 505, 506, 540, 575, 580, 582, 583, 584, 585, 588, 597, 610 (1, 2, 4, 5, 6, 7, 8, 9, 11, 12, 16, 17, 18, 19, 20, 21, 22, 30, 33, 34, 36, 37, 38, 48, 53, 69, 70, 71, 72, 73, 73A, 74, 75, 76, 78, 82, 83, 84, 85, 86, 87, 88, 104, 121, 123, 124, 125, 127, 128, 131, 132, 134, 135, 137, 139, 143, 159).
Pucciniastrum goeppertianum (Kühn) Kleb.	Witches' broom rust	Abies balsamea (L.) Mill. 37, 84, 172, 583, 584, 585 (10, 77).
	Witches' broom	Vaccinium cespitosum Michx.

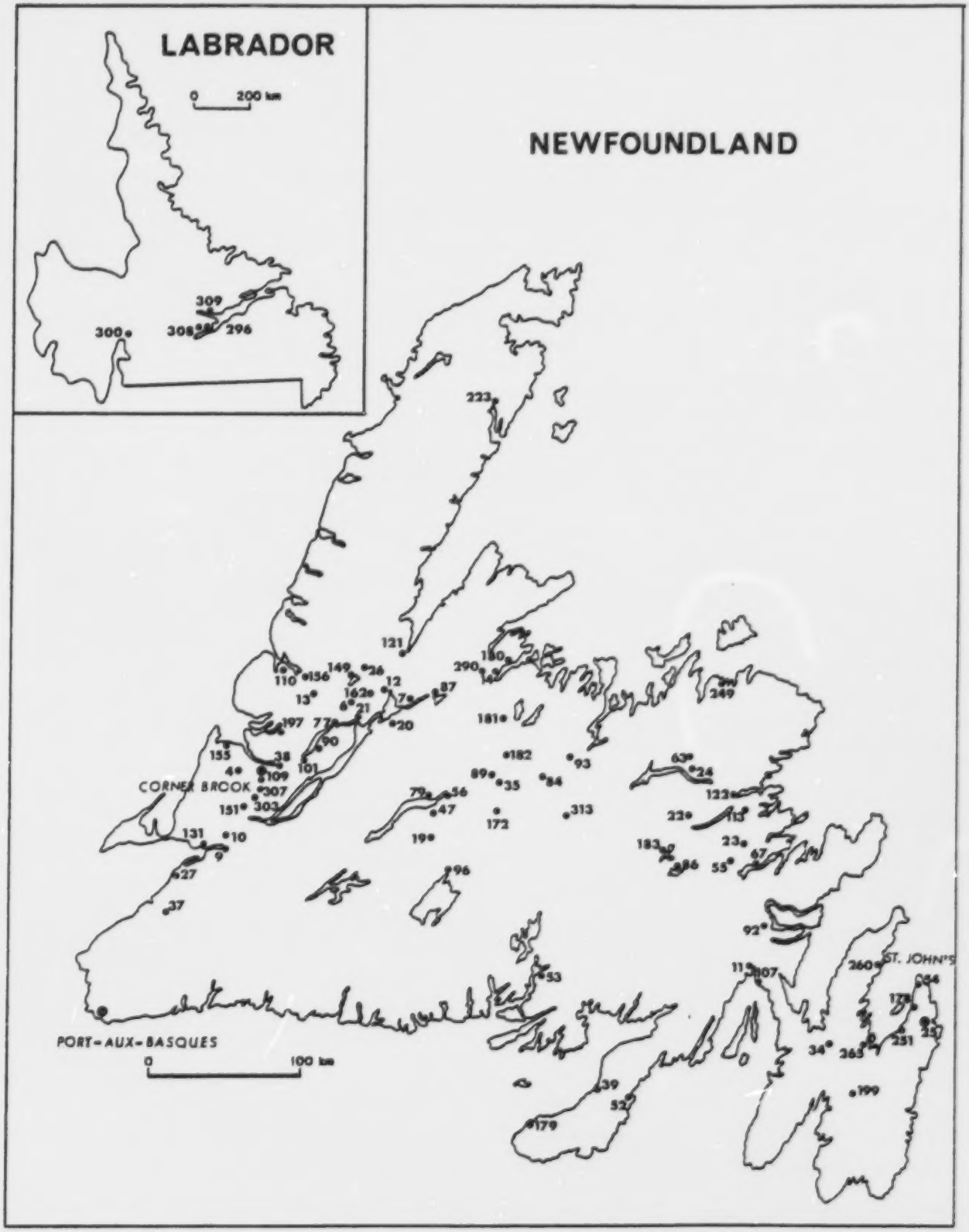

Fig. 6. Map showing 76 locations where stem rusts were collected.

Stem Diseases - Miscellaneous

Pathogen	Disease	Host
Apiosporina collinsii (Schw.) Höhn. (= Dimerosporium collinsii (Schw.) Thüm.)	Witches' broom	Amelanchier species 11, 35, 97, 231 (69, 71, 74). Pyrus species 103 (88). Viburnum cassinoides L. 97, 231 (69).
Apiosporina morbosa (Schw.) Arx	Black knot	Prunus avium (L.) L. 583, 584, 585 (172). Prunus domestica L. 583, 584, 585 (172). Prunus insititia L. 66, 511, 512, 513, 514, 583, 584, 585 (86, 87, 88, 89, 95). Prunus pensylvanica L.f. 2, 3, 6, 11, 20, 22, 24, 25, 27, 35, 38, 51, 55, 62, 72, 77, 81, 83, 89, 90, 91, 109, 122, 123, 128, 133, 141, 164, 172, 177, 184, 185, 186, 322, 510, 583, 584, 585, 586, 588, 589, 590, 591, 592, 593, 594, 619 (4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 24, 43, 44, 53, 57, 68, 70, 72, 73A, 74, 75, 76, 78, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 92, 104, 125, 137, 139, 169, 172). Prunus species 2, 14, 109, 252, 576, 583, 584, 585, 623, 628, 638 (6, 8, 20, 21, 22, 53, 65, 75, 85, 86, 87, 88, 90, 95, 125, 171). Prunus virginiana L. 583, 584, 585 (18, 86).

Pathogen	Disease	Host
Chlorosplenium aeruginosum (Oed. ex S.F. Gray) de Not.	Stain - green	Abies balsamea (L.) Mill. Alnus rugosa (Du Roi) Spreng.
Cucurbidothis pityophila (Fr.) Petrak (= Cucurbitaria pityophila (Fr.) de Not.)	Stem girdle	Pinus strobus L. 9, 187 (69, 88).
Cytidia salicina (Fr.) Burt	Stem canker	Alnus species
Dermea balsamea (Pk.) Seav.	Dieback	Abies balsamea (L.) Mill. 19, 56 (18, 49).
Diatrypella betulina Pk.	On branches and twigs	Betula papyrifera Marsh.
Polyporus picipes Fr.	On decaying wood	Picea glauca (Moench) Voss 126.

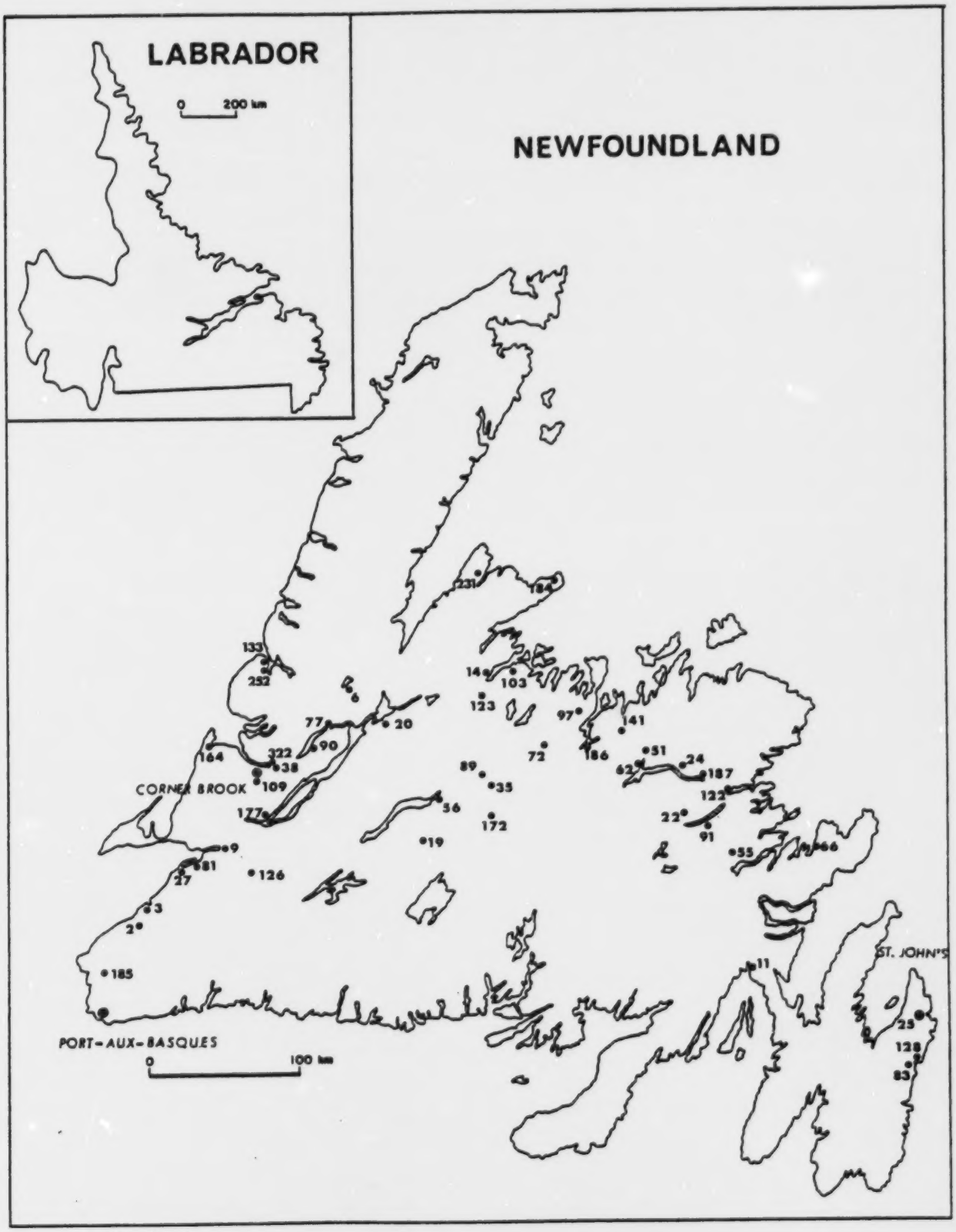

Fig. 7. Map showing 45 locations where miscellaneous stem diseases were collected.

Foliage Diseases of Coniferous Trees, Shrubs or Herbaceous Plants - Needle Rusts

Pathogen	Disease	Host
Chrysomyxa empetri Schroet. ex Cummins	Needle rust	Picea glauca (Moench) Voss 5, 25, 49, 168, 196, 208, 215, 244, 306, 582, 583, 584, 628 (4, 8, 9, 37, 60, 74, 75). Picea mariana (Mill.) B.S.P. 10, 57, 77, 162, 584 (172). Picea species 582, 583, 584, 585 (28, 167, 171).
Chrysomyxa ledi de Bary	Needle rust	Picea glauca (Moench) Voss 4, 7, 11, 20, 21, 34, 35, 42, 43, 48, 52, 54, 56, 67, 92, 104, 106, 122, 131, 165, 171, 175, 179, 188, 191, 196, 199, 202, 203, 206, 207, 520, 569, 578, 579, 580, 583, 584, 585 (3, 4, 16, 17, 18, 19, 24, 45, 47, 48, 57, 83, 84, 85, 88, 89, 90, 104, 123, 132). Picea mariana (Mill.) B.S.P. 4, 7, 11, 12, 14, 19, 20, 21, 24, 25, 34, 35, 37, 42, 46, 47, 48, 51, 52, 53, 55, 56, 58, 67, 77, 84, 89, 92, 104, 106, 119, 122, 127, 131, 159, 160, 171, 172, 173, 175, 179, 183, 188, 191, 196, 199, 200, 202, 204, 205, 206, 207, 248, 518, 520, 569, 578, 579, 580, 581, 582, 583, 584, 585, 591, 592, 593, 627 (1, 2, 4, 17, 18, 19, 24, 30, 33, 38, 39, 40, 47, 48, 50, 57, 70, 75, 77, 82, 83, 84, 85, 87, 88, 89, 90, 91, 104, 121, 132, 137, 138, 139, 144). Picea species 200, 201, 583, 584, 585 (25, 49, 82).

Pathogen	Disease	Host
Chrysomyxa ledicola Lagerh.	Needle rust	Picea glauca (Moench) Voss 4, 7, 11, 20, 21, 25, 34, 35, 40, 44, 48, 49, 50, 52, 53, 54, 57, 67, 92, 104, 106, 122, 131, 139, 165, 171, 175, 179, 188, 191, 196, 202, 203, 206, 207, 303, 520, 569, 578, 579, 580, 581, 582, 583, 584, 585, 628 (1, 2, 4, 9, 10, 11, 12, 14, 17, 18, 19, 24, 29, 30, 47, 48, 49, 57, 60, 78, 80, 83, 84, 85, 88, 90, 95, 104, 142, 171). Picea mariana (Mill.) B.S.P. 3, 4, 7, 11, 14, 19, 20, 21, 22, 24, 25, 31, 34, 35, 37, 40, 42, 44, 45, 46, 47, 48, 51, 52, 53, 55,56, 57, 58, 61, 66, 67, 69, 77, 84, 88, 89, 92, 104, 106, 119, 122, 127, 131, 139, 157, 159, 160, 162, 165, 171, 172, 175, 179, 183, 188, 189, 191, 196, 200, 202, 204, 205, 206, 207, 208, 209, 216,248, 251, 259, 303, 308, 324, 518, 520, 521, 522, 569, 578, 579, 580, 581, 582, 583, 584, 585, 591, 592, 593, 603, 606, 619 (1, 2, 4, 5, 8, 9, 13, 14, 15, 16, 17, 18, 19, 24, 30, 32, 33, 38, 40, 42, 43, 44, 45, 47, 48, 49, 50, 57, 70, 71, 73, 75, 76, 77, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 90, 95, 105, 116, 135, 137, 142, 171, 172). Picea pungens Engelm. 25, 159, 581, 582, 584 (1, 2, 123, 139, 142, 171). Picea sitchensis (Bong.) Carr. 83 (171).

Pathogen	Disease	Host
Chrysomyxa ledicola Lagerh. (Concl'd.)		Picea species 200, 201, 582, 583, 584, 585 (25, 28, 82).
Chrysomyxa pirolata Wint.	Cone rust	Picea glauca (Moench) Voss 25, 576, 582, 583, 584 (32, 105, 144, 151, 167).
		Picea mariana (Mill.) B.S.P. 323, 581, 582, 583, 584, 585, 619 (32, 68, 141, 144, 151, 167, 171, 172).
Chrysomyxa species	Needle rust	Picea glauca (Moench) Voss 24, 53, 55, 69, 92, 188, 582, 583 (22, 53, 62, 86).
		Picea mariana (Mill.) B.S.P. 24, 53, 55, 69, 92, 188, 583 (20, 22, 53, 86, 87, 104).
		Picea species 24, 53 (21, 51).
Coleosporium asterum (Diet.) Syd.	Needle rust	Pinus banksiana Lamb. 188, 253 (10, 77, 138).
		Pinus resinosa Ait. 10, 20, 38, 84, 253, 580, 582 (9, 20, 50, 76).
		Pinus strobus L. 20, 38, 84, 253, 580, 582 (9, 76).
		Pinus sylvestris L. 20, 38, 84, 253, 580, 582 (9, 69, 76).
Melampsora medusae Thüm.	Needle rust	Larix laricina (Du Roi) K. Koch 592 (11, 12, 78).
Milesia fructuosa Faull	Needle rust	Abies balsamea (L.) Mill. 39, 156, 271 (9, 71, 104).

Pathogen	Disease	Host
Milesia species	Needle rust	Abies balsamea (L.) Mill. 4, 5, 8, 21, 24, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 81, 84, 114, 151, 171, 175, 191, 206, 207, 519, 580, 581, 582, 583, 584, 585, 591, 592, 594 (14, 15, 16, 17, 18, 19, 22, 24, 43, 44, 45, 47, 48, 49, 50, 53, 57, 65, 82, 83, 84, 85, 90, 95, 116, 135).
Pucciniastrum epilobii Otth (= Pucciniastrum pustulatum (Pers.) Diet.)	Needle rust	Abies balsamea (L.) Mill. 4, 5, 6, 8, 9, 14, 19, 21, 24, 25, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 40, 41, 51, 52, 57, 81, 84, 87, 88, 90, 114, 122, 151, 152, 165, 171, 173, 175, 191, 197, 201, 206, 207, 210, 211, 264, 289, 296, 308, 309, 317, 331, 332, 517, 519, 568, 576, 580, 581, 582, 583, 584, 585, 591, 592, 594, 600, 603, 614, 619, 627, 638, 640, 641, 646 (4, 5, 6, 8, 9, 13, 14, 15, 16, 17, 18, 19, 22, 24, 30, 32, 34, 35, 37, 42, 43, 44, 45, 47, 48, 49, 50, 53, 57, 65, 68, 69, 70, 71, 72, 73, 73A, 75, 76, 79, 80, 81, 82, 83, 84, 85, 95, 100, 104, 116, 125, 144, 167, 171, 172). Epilobium angustifolium L. (alternate host) 93 (30).
Uredinopsis species	Needle rust	Abies balsamea (L.) Mill. 4, 519 (90).

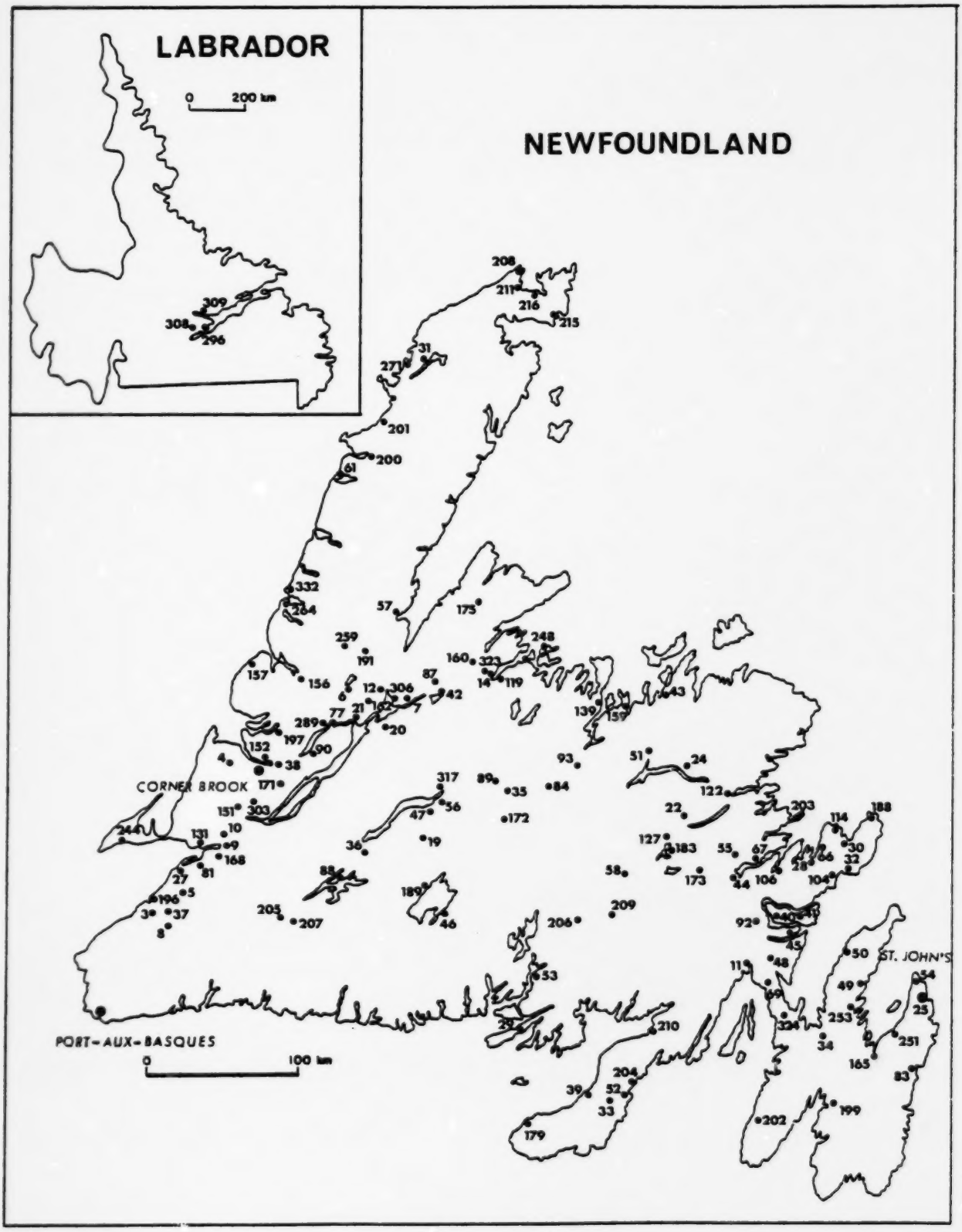

Fig. 8. Map showing 123 locations where needle rusts were collected.

Foliage Diseases of Coniferous Trees (Including Seedlings), Shrubs or Herbaceous Plants - Needle Casts

Pathogen	Disease	Host
Hypodermella laricis Tub.	Needle cast	Larix laricina (Du Roi) K. Koch 5, 14, 16, 18, 19, 20, 21, 22, 27, 33, 35, 56, 64, 67, 77, 79, 80, 81, 82, 83, 84, 85, 86, 118, 120, 122, 167, 188, 197, 303, 503, 515, 516, 580, 582, 583, 584, 585, 609 (4, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 24, 34, 42, 43, 44, 48, 70, 72, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 90, 104, 120, 123, 132, 134). Larix leptolepis (Sieb. and Zucc.) Gord. 22.
Hypodermella species	Needle cast	Larix leptolepis (Sieb. and Zucc.) Gord. 22.
Isthmiella crepidiformis (Darker) Darker (= Bifusella crepidiformis Darker)	Needle cast	Picea glauca (Moench) Voss 151, 506, 580, 582, 583, 584, 585 (9, 13, 14, 15, 24, 44, 81, 90). Picea mariana (Mill.) B.S.P. 22, 27, 40, 43, 45, 56, 59, 65, 66, 67, 74, 75, 76, 77, 78, 92, 111, 122, 152, 162, 189, 190, 191, 223, 308, 506, 531, 540, 569, 576, 580, 582, 583, 584, 585 (4, 9, 15, 24, 25, 34, 43, 44, 69, 73, 75, 76, 79, 80, 81, 90, 104, 122, 132, 172). Picea species 583, 584, 585 (23, 56).

Pathogen	Disease	Host
Isthmiella faullii (Darker) Darker (= Bifusella faullii Darker)	Needle cast	Abies balsamea (L.) Mill. 1, 2, 4, 5, 6, 7, 8, 9, 13, 21, 30, 35, 37, 44, 47, 59, 60, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 79, 83, 98, 106, 111, 124, 133, 138, 153, 154, 155, 165, 171, 192, 193, 194, 240, 262, 308, 309, 317, 517, 519, 576, 581, 582, 583, 584, 585, 587, 588, 619, 621, 626 (1, 2, 7, 8, 9, 11, 12, 14, 15, 18, 24, 37, 39, 43, 44, 48, 68, 69, 71, 73A, 74, 75, 76, 78, 80, 81, 82, 83, 84, 88, 90, 100, 104, 120, 122, 123, 135, 139, 171, 172).
Lirula macrospora (Hartig) Darker (= Lophodermium filiforme Darker)	Needle cast	Picea glauca (Moench) Voss 6, 10, 22, 59, 67, 77, 78, 506, 580, 582, 584 (8, 15, 43, 44, 80, 81, 100, 104). Picea mariana (Mill.) B.S.P. 6, 22, 27, 40, 45, 56, 59, 65, 66, 67, 74, 75, 76, 78, 80, 92, 111, 189, 190, 297, 308, 506, 580, 582, 583, 584, 585 (4, 8, 9, 13, 14, 15, 34, 43, 44, 72, 75, 76, 79, 80, 81, 100, 104, 120, 121).
Lirula nervata (Darker) Darker (= Hypodermella nervata Darker)	Needle cast	Abies balsamea (L.) Mill. 23, 63, 67, 86, 110, 584 (8, 9, 30, 75, 104).
Lophodermium nitens Darker	Needle cast	Pinus strobus L. 7.
Lophodermium pinastri (Schrad. ex Fr.) Chev.	Needle cast	Pinus banksiana Lamb. 25, 90, 199, 253, 581, 582, 585 (1, 2, 6, 68, 69, 138, 139).

Pathogen	Disease	Host
Lophodermium pinastri (Schrad. ex Fr.) Chev. (Concl'd.)		Pinus resinosa Ait. 1, 25, 35, 581, 582, 583, 585, 595 (1, 2, 9, 14, 43, 70, 80, 100, 137, 139, 172). Pinus species 22. Pinus strobus L. 20, 22, 23, 35, 84, 86, 87, 136, 178, 237, 582, 583, 585, 629 (76, 171, 172). Pinus sylvestris L. 1, 25, 35, 67, 84, 136, 178, 199, 253, 272, 582, 583, 585, 595, 629 (5, 6, 7, 8, 9, 39, 68, 69, 70, 71, 73, 75, 76, 104, 120, 121, 122, 127, 137, 172).
Lophodermium species	Needle cast	Abies balsamea (L.) Mill. 2, 5, 8, 9, 20, 32, 37, 44, 47, 61, 62, 63, 65, 66, 67, 68, 69, 70, 71, 72, 88, 111, 114, 195, 196, 197, 198, 583, 584, 585, 587, 588 (8, 9, 15, 17, 18, 19, 44, 48, 75, 81, 83, 84, 85, 138). Picea glauca (Moench) Voss 90. Picea species 22 (5). Pinus species 22. Pinus sylvestris L. 25 (13).
Rhizothyrium abietis Naum.	Needle cast	Abies balsamea (L.) Mill. 156 (28).

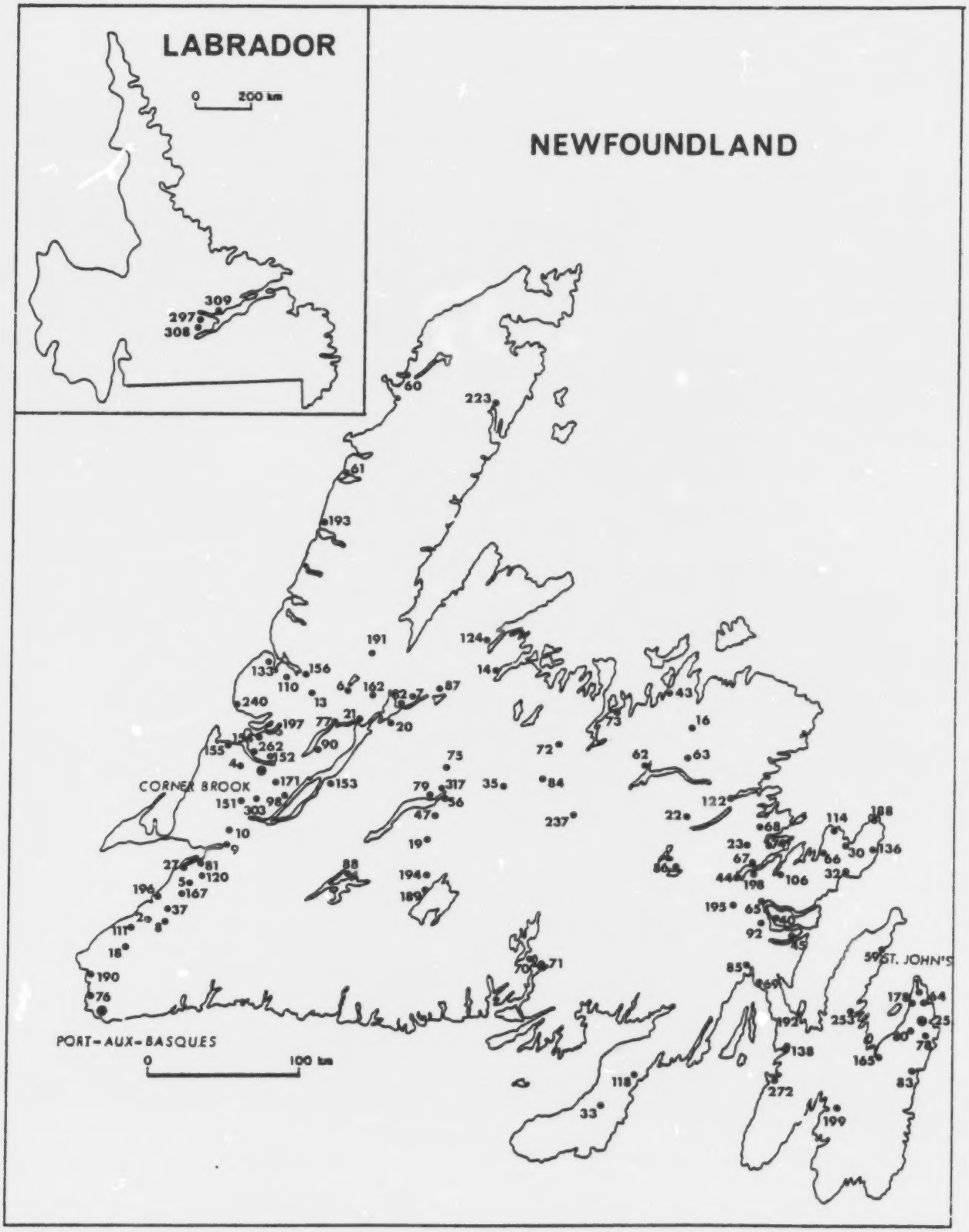

Fig. 9. Map showing 109 locations where needle casts were collected.

Foliage Diseases of Coniferous Trees (Including Seedlings), Shrubs or Herbaceous Plants - Miscellaneous

Pathogen	Disease	Host
Bothrodiscus pinicola Shear	Twig blight	Abies balsamea (L.) Mill.
Diplodia pinea (Desm.) Kickx	Tip blight	Pinus nigra Arn. 25, 308 (7, 37, 123).
Dothistroma pini Hulb.	Red-banded needle blight	Pinus banksiana Lamb. 22 (169).
		Pinus nigra Arn. 25, 326 (1, 18, 171).
		Pinus resinosa Ait. 9, 68, 113, 199 (68, 82, 105, 169, 171).
		Pinus sylvestris L. 9, 68, 199 (68, 171).
Fusicoccum abietinum (Hartig) Prill. and Del.	Red flag	Abies balsamea (L.) Mill. 2, 17, 40, 51, 55, 56, 65, 67, 88, 89, 134, 213, 214, 215, 216, 577, 582, 583, 584, 585 (8, 9, 15, 16, 18, 19, 45, 49, 75, 76, 82, 83, 85, 104).
Meliola pinicola Dearn.	Sooty mold	Abies balsamea (L.) Mill. 199, 582 (8, 9, 75).
		Picea glauca (Moench) Voss 78, 199.
		Picea mariana (Mill.) B.S.P. 582 (8, 9, 75).
Phacidium infestans Karst.	Snow blight	Picea mariana (Mill.) B.S.P. 22, 84.
		Picea species 22.
Phacidium species	Snow blight	Picea mariana (Mill.) B.S.P. 217, 523 (18, 84).

Pathogen	Disease	Host
Phaeocryptopus nudus (Pk.) Petrak (= Adelopus balsamicola (Pk.) Theiss.)	Needle blight	Abies balsamea (L.) Mill. 54,81, 86, 92, 110 (30).
Phomopsis juniperovora Hahn.	Twig blight	Thuja occidentalis L. 25, 90 (5, 133, 157).
Rehmiellopsis balsameae Waterman	Tip blight	Abies balsamea (L.) Mill. 18, 25, 37, 45, 51, 60, 81, 84, 101, 116, 153, 199, 212, 214, 287, 308, 506, 552, 571, 581, 582, 583, 584, 585, 619, 621, 622, 642 (1, 3, 4, 5, 6, 15, 18, 19, 37, 48, 49, 69, 70, 73, 73A, 74, 75, 83, 84, 85, 104, 123, 137, 143,167, 172).
Rhizosphaera abietis Mang. and Har.	Needle blight	Abies balsamea (L.) Mill. 5 (8, 9).
Sirococcus strobilinus Preuss	Shoot blight	Picea mariana (Mill.) B.S.P. 72, 326, 584(1, 32, 38, 68, 144, 171).
Sphaerulina taxicola (Pk.) Berl.	Leaf spot	Taxus canadensis Marsh.

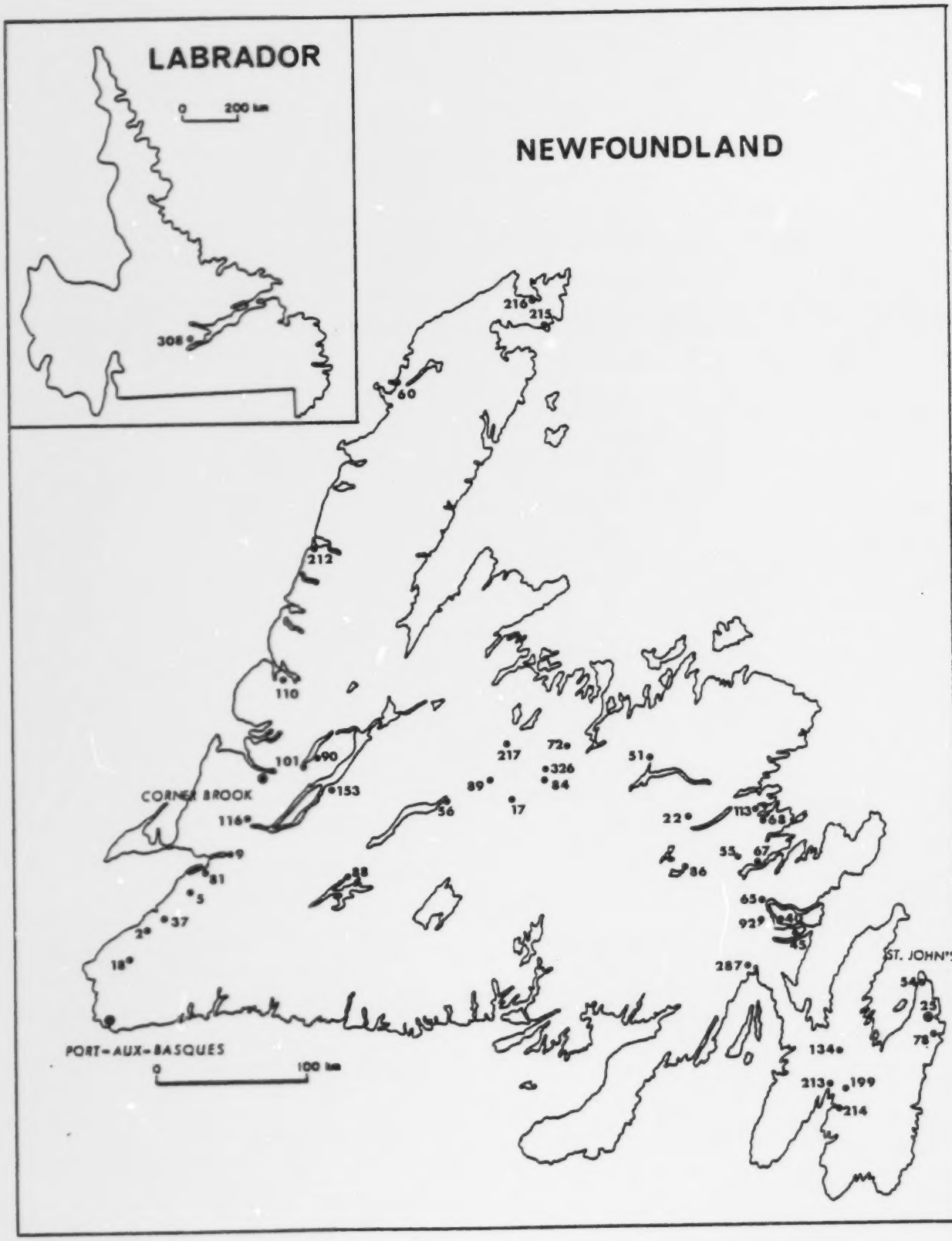

Fig. 10. Map showing 43 locations where miscellaneous foliage diseases of coniferous trees, shrubs or herbaceous plants were collected.

Foliage Diseases of Broadleaved Trees, Shrubs or Herbaceous Plants - Leaf Rusts

Pathogen	Disease	Host
Coleosporium asterum (Diet.) Syd. (= Coleosporium solidaginis Thüm.)	Leaf rust	Solidago species 573 (30).
Gymnoconia peckiana (Howe) Trott.	Orange rust (on leaves)	Rubus canadensis L. Rubus species
Gymnosporangium cornutum Arth. and Kern (= Gymnosporangium aurantiacum Chev.)	Rust gall (on leaves)	Acer spicatum Lam. 31, 105, 107 (81, 82). Sorbus americana Marsh 14, 29, 32, 35, 40, 44, 48, 51, 53, 56, 66, 69, 70, 83, 92, 104, 105, 106, 107, 110, 111, 115, 121, 122, 139, 141, 188, 223, 227, 231, 239, 247, 250, 260, 305, 537, 580, 581, 582, 583, 584, 585, 608, 621, 627 (5, 6, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 30, 70, 71, 72, 73, 73A, 75, 76, 78, 80, 81, 82, 83, 84, 85, 88, 93, 104, 128). Sorbus decora (Sarg.) Schneid. 14, 108. Sorbus species 108, 583, 584, 585 (167).
Gymnosporangium species	Rust gall (on leaves)	Amelanchier species 35 (82). Sorbus americana Marsh 5, 228 (82, 90). Sorbus aucuparia L. 109. Sorbus decora (Sarg.) Schneid. 57 (90).

Pathogen	Disease	Host
Melampsora abietis-canadensis Ludwig ex Arth.	Leaf rust	Populus tremuloides Michx. 11, 14, 24, 35, 81, 90, 93, 103, 123, 290, 583, 584, 585, 636 (30, 69, 88, 167, 172).
Melampsora abieti-capraearum Tub.	Leaf rust	Salix bebbiana Sarg. 173, 300, 625 (4). Salix discolor Muhl. 24, 51, 77, 173, 300, 625 (11, 12, 71, 72, 73A, 75, 78, 104, 121). Salix species 14, 29, 35, 57, 77, 110, 122, 188, 199, 296, 308, 506, 573, 582, 583, 584, 585, 621, 625 (8, 11, 12, 30, 37, 71, 72, 73A, 75, 78, 92, 104, 121, 167).
Melampsora epitea Thüm.	Rust	Populus tremuloides Michx. 84, 524, 538 (81, 104). Pyrola species 133 (30). Salix discolor Muhl. Salix species 29, 35, 84, 122, 152, 199, 229, 296, 308, 503, 506, 524, 533, 538, 582 (4, 6, 8, 75, 81, 91).
Melampsora paradoxa Diet. and Holw.	Leaf rust	Salix species 122 (10).
Melampsora species	Leaf rust	Populus tremuloides Michx. 35, 67, 84, 93, 103, 122, 149, 251, 572, 577, 584, 585 (13, 42, 79, 139). Salix species 149, 251, 572 (90).

Pathogen	Disease	Host
Melampsoridium betulinum (Fr.) Kleb.	Leaf rust	Betula papyrifera Marsh. 53, 188, 214, 278, 531 (8, 10, 11, 12, 75, 77, 78, 121).
Puccinia coronata Cda.	Crown rust (on leaves)	Rhamnus alnifolia L'Hér.
Puccinia porphyrogenita Curt.	Leaf rust	Cornus canadensis L.
Puccinia recondita Rob. ex Desm.	Leaf rust	Thalictrum polygamum Muhl.
Puccinia sparganioides Ell. and Barth.	Leaf rust	Amelanchier species 78, 565 (81).

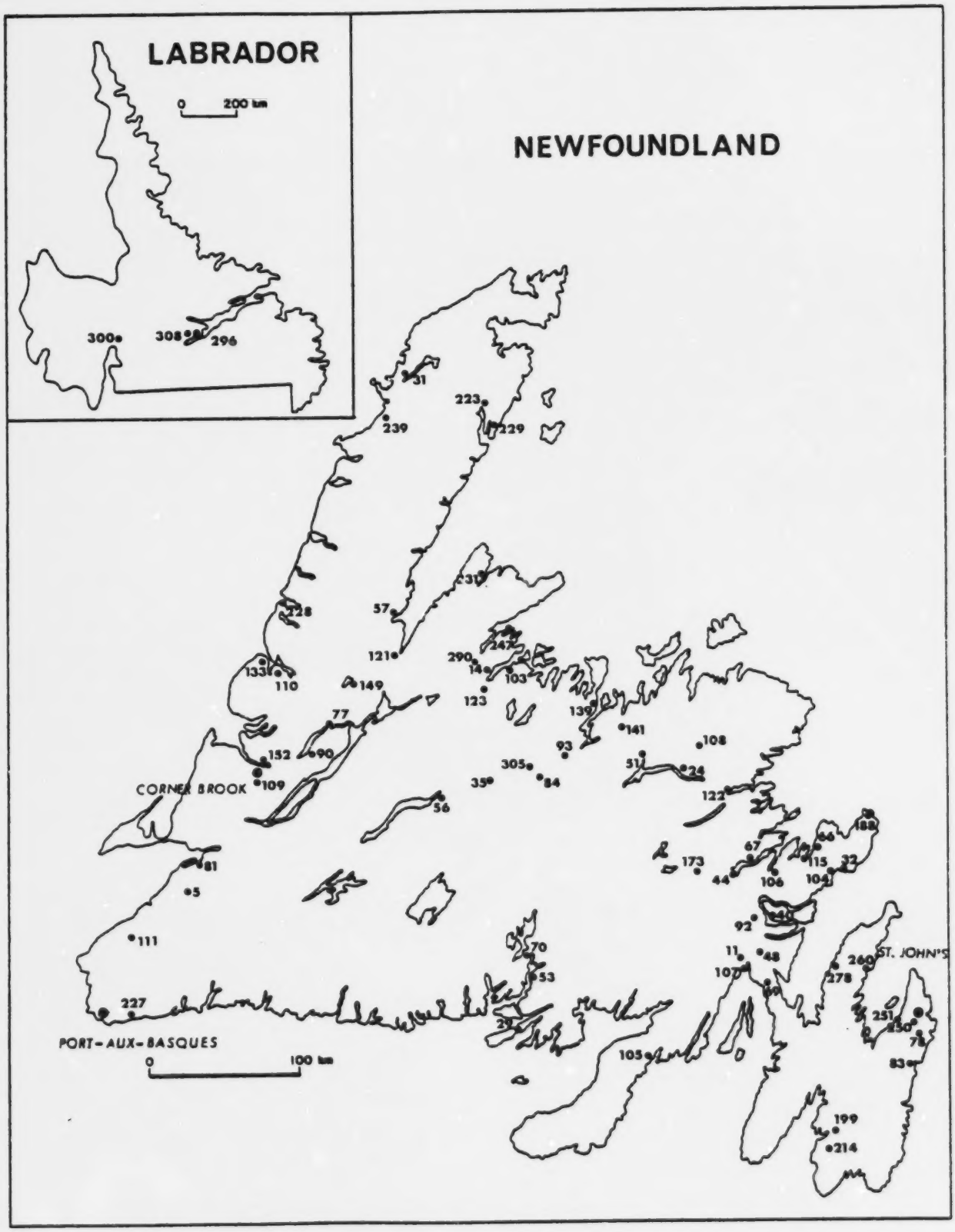

Fig. 11. Map showing 65 locations where leaf rusts of broadleaved trees, shrubs or herbaceous plants were collected.

Foliage Diseases of Broadleaved Trees, Shrubs or Herbaceous Plants - Leaf Spots

Pathogen	Disease	Host
Cercospora salicina Ell. and Ev.	Leaf spot	Salix discolor Muhl. Salix species 6, 524, 570, 583, 584, 585 (8, 9, 15, 44, 73A, 75, 81).
Ciborinia whetzelii (Seav.) Seav. (= Ciborinia bifrons (Whetz.) Whetz.)	Ink spot	Populus tremuloides Michx. 7, 12, 14, 26, 35, 57, 63, 67, 68, 74, 84, 93, 95, 96, 97, 98, 99, 100, 101, 102, 103, 122, 139, 160, 161, 169, 175, 218, 219, 220, 254, 290, 504, 517, 571, 577, 579, 583, 584, 585, 590, 601, 607, 619, 620, 621, 625, 628 (1, 3, 4, 5, 6, 8, 9, 10, 13, 15, 16, 17, 18, 19, 20, 22, 26, 29, 34, 35, 36, 42, 44, 45, 47, 48, 50, 53, 68, 69, 70, 72, 73, 73A, 75, 76, 77, 79, 82, 83, 84, 85, 86, 88, 92, 104, 125, 127, 128, 131, 132, 137, 139, 167, 172).
Cladosporium humile Davis (= Venturia acerina Plakidas nom. nud.)	Leaf spot	Acer rubrum L. 112 (81).
Cladosporium subsessile Ell. and Barth.	Leaf spot	Populus tremuloides Michx. 14, 567 (27, 93).
Coccomyces hiemalis Higgins	Shot hole	Prunus pensylvanica L.f. 18, 25, 35, 83, 90, 112, 197, 221, 250, 308, 583, 584, 619 (4, 5, 6, 8, 69, 71, 73, 73A, 74, 75, 82, 83, 137). Prunus species 583, 584, 585 (22). Prunus virginiana L. 93, 222 (18, 84).

Pathogen	Disease	Host
Cylindrosporium betulae Davis	Leaf spot	Betula papyrifera Marsh. 18, 81, 88, 90, 116, 127, 212, 223, 525, 526, 576, 583, 584, 585, 594 (4, 8, 9, 15, 18, 44, 75, 76, 81, 82, 83, 84, 90, 104, 139).
Cylindrosporium species	Leaf spot	Prunus pensylvanica L.f. 93, 109, 275, 583 (90, 93).
Elsinoë corni Jenk. and Bot.	Leaf spot or anthracnose	Cornus species 120 (81).
Gloeosporium species	Leaf spot	Betula papyrifera Marsh. 533 (91).
Gnomonia ulmea (Schw.) Thüm.	Leaf spot	Ulmus species 77 (30).
Gnomoniella coryli (Batsch ex Fr.) Sacc.	Leaf spot	Corylus cornuta Marsh.
Kabatiella apocrypta (Ell. and Ev.) Arx (= Gloeosporium apocryptum Ell. and Ev.)	Large leaf spot or anthracnose	Acer rubrum L. 14, 16, 32, 36, 44, 48, 52, 56, 61, 66, 67, 74, 90, 97, 98, 104, 105, 110, 113, 114, 117, 118, 119, 120, 141, 155, 168, 224, 225, 263, 267, 307, 325, 528, 531, 532, 580, 581, 583, 584, 585, 628, 630 (4, 6, 8, 9, 15, 16, 17, 18, 32, 34, 44, 47, 48, 69, 70, 72, 75, 81, 82, 83, 84, 131, 132, 137, 144, 167). Acer species 583, 584, 585 (45). Acer spicatum Lam. 14, 16, 32, 36, 44, 48, 52, 56, 61, 66, 67, 74, 82, 84, 90, 96, 97, 98, 104, 105, 110, 113, 114, 117, 118, 119, 120, 121, 141, 155, 168, 188, 224, 225, 255, 263, 267, 307, 325, 514, 528, 529, 530,

Pathogen	Disease	Host
Kabatiella apocrypta (Ell. and Ev.) Arx (= Gloeosporium apocryptum Ell. and Ev.) (Concl'd.)		531, 532, 571, 580, 581, 583, 584, 585, 598, 602, 605, 615, 628 (5, 6, 9, 11, 12, 15, 16, 17, 18, 21, 22, 32, 34, 44, 47, 48, 69, 70, 71, 72, 73, 73A, 74, 75, 76, 78, 81, 82, 83, 84, 86, 87, 131, 132, 134, 137, 144, 167). Betula papyrifera Marsh. 188 (12, 78).
Marssonina brunnea (Ell. and Ev.) Sacc.	Leaf spot	Populus nigra var. italica Muenchh. 25 (69, 140).
Mycosphaerella colorata (Pk.) Earle	Leaf spot	Kalmia angustifolia L. 35 (75).
Mycosphaerella species	Leaf spot	Acer rubrum L. 273, 600, 620 (73). Epilobium angustifolium L. 101, 273, 303, 600, 620 (69, 72, 73). Fraxinus species 35, 53 (81). Ledum species 80 (76). Populus tremuloides Michx. 35, 47, 53, 152, 273, 580, 583, 584, 585, 600, 620 (15, 44, 73A, 81). Sorbus americana Marsh 107 (73, 81). Sorbus aucuparia L. 113, 582 (8, 9, 75). Sorbus species 599, 621 (71).

Pathogen	Disease	Host
Phleospora aceris (Lib.) Sacc.	Small leaf spot	Acer spicatum Lam. 110 (30, 104).
Phleospora ulmi (Fr.) Wallr.	Leaf spot	Ulmus glabra var. camperdownii Rehd. 135 (28).
Phyllosticta minima (Berk. and Curt.) Underw. and Earle	Leaf spot or purple eye spot	Acer rubrum L. 9, 12, 13, 14, 15, 22, 24, 25, 43, 44, 51, 53, 61, 67, 90, 97, 101, 109, 111, 112, 113, 114, 115, 120, 122, 125, 133,152, 167, 168, 173, 187, 223, 226, 240, 258, 267, 268, 274, 281, 289, 291, 303, 531, 542, 566, 583, 584, 604, 621 (4, 5, 6, 8, 11, 12, 13, 14, 15, 18, 32, 34, 69, 71, 72, 73, 73A, 74, 75, 76, 78, 79, 81, 82, 83, 104, 123, 127, 132, 134, 139, 144, 172). Acer spicatum Lam. 22, 51, 61, 90, 101, 111, 114, 120, 125, 133, 152, 168, 173, 187, 223, 240, 258, 267, 291, 303, 312, 531, 583, 584, 585, 604, 621, 628 (4, 5, 6, 9, 18, 34, 71, 72, 73, 74, 75, 76, 123, 127, 132, 144, 167). Sorbus americana Marsh 44, 69 (84).
Phyllosticta species	Leaf spot	Populus nigra var. italica Muenchh. 25 (69).
Ramularia effusa Pk.	Leaf spot	Vaccinium species
Rhytisma acerinum (Pers.) Fr.	Tar spot	Acer rubrum L. 53 (8, 75). Acer species 583 (86, 87).

Pathogen	Disease	Host
Rhytisma acerinum (Pers.) Fr. (Concl'd.)		Acer spicatum Lam. 14, 120, 583, 584, 585 (18, 19, 20, 21, 22, 53, 85).
Rhytisma punctatum (Pers.) Fr.	Speckled tar spot	Acer species 583 (87).
		Acer spicatum Lam. 4, 6, 24, 51, 110, 116, 535, 536, 583, 584, 585 (8, 9, 15, 18, 19, 21, 22, 44, 53, 75, 85, 90, 91, 93, 104).
Rhytisma salicinum (Pers.) Fr.	Tar spot	Salix discolor Muhl. 51, 571(6).
		Salix species 35, 109, 180, 527, 534, 570, 583, 584, 585, 628 (4, 18, 19, 20, 71, 81, 85, 90, 137, 144, 167).
Rhytisma species	Tar spot	Sambucus species 583 (4).
Septoria betulae (Lib.) West.	Leaf spot	Betula papyrifera Marsh. 34, 71, 94, 101, 121, 133, 152, 168, 191, 503, 582, 583 (5, 6, 27, 69, 73, 81, 90, 91, 93, 128).
Septoria musiva Peck.	Leaf spot	Populus balsamifera L. 18 (146).

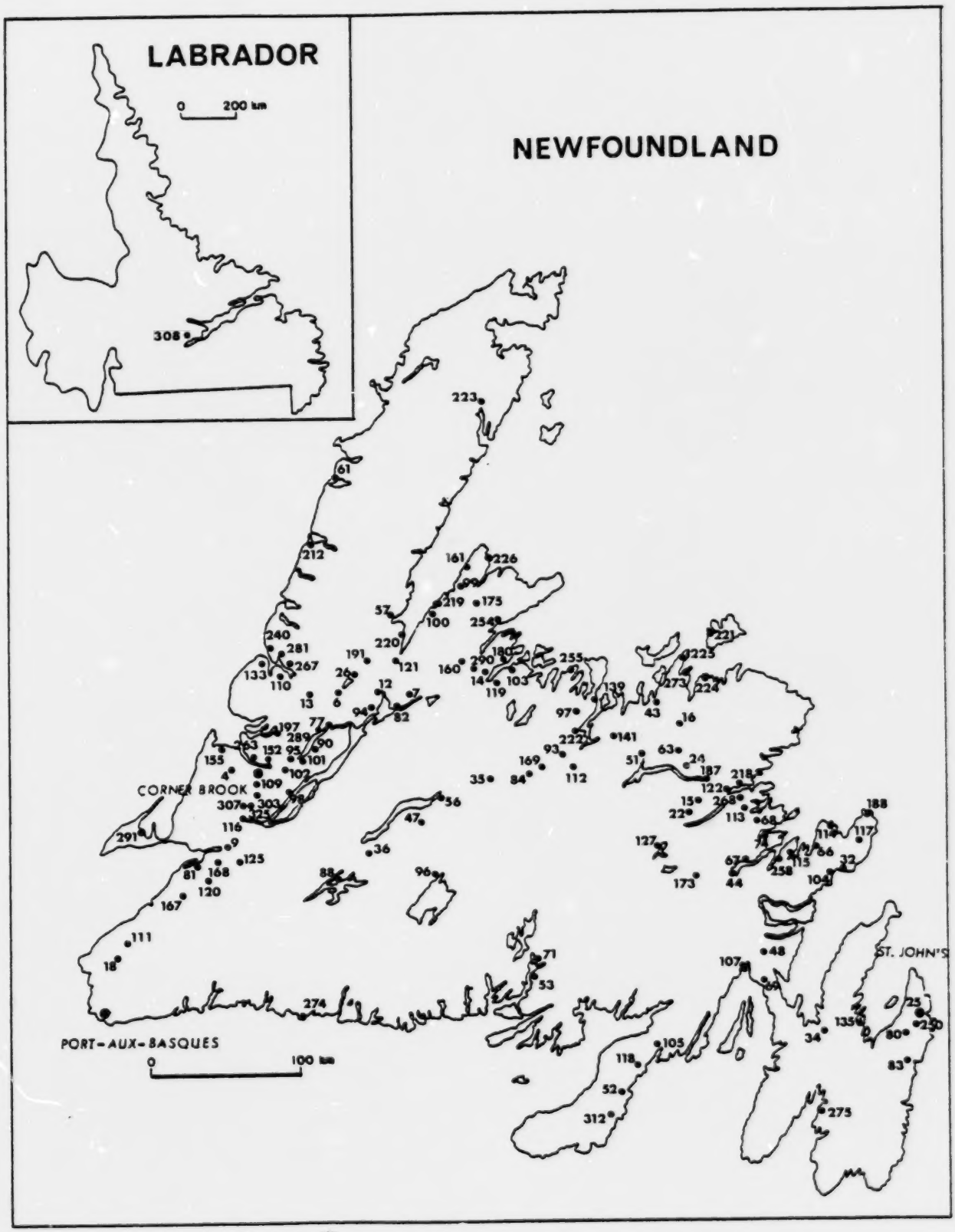

Fig. 12. Map showing 121 locations where leaf spots of broadleaved trees, shrubs or herbaceous plants were collected.

Foliage Diseases of Broadleaved Trees, Shrubs or Herbaceous Plants - Leaf Blisters

Pathogen	Disease	Host
Taphrina carnea Johans.	Yellow to red leaf blister	Betula alleghaniensis Britt. 101, 110 (32, 69, 81, 104, 144).
		Betula papyrifera Marsh. 110, 168, 190, 502 (32, 71, 144).
Taphrina cerasi (Fckl.) Sadeb. (= Taphrina wiesneri (Rathay) Mix)	Witches' broom	Prunus pensylvanica L.f. 11, 25, 139, 250, 257, 308, 581, 582, 619, 621 (4, 69, 70, 71, 134, 137).
Taphrina confusa (Atk.) Gies.	Pockets	Prunus species 583, 584, 585 (22).
		Prunus virginiana L. 3, 93 (18, 83).
Taphrina populina Fr. (= Taphrina aurea Fr.)	Yellow leaf blister	Populus nigra L. 249 (9).
		Populus nigra var. italica Muenchh. 25 (7, 69, 70, 71).
		Populus species 11, 250 (4, 42, 72, 73A).
		Populus tremuloides Michx. 84, 90, 93, 621 (5, 9, 18, 35, 128).
Taphrina robinsoniana Giesenh.	Catkin blister	Alnus rugosa (Du Roi) Spreng. 38, 44, 51, 93, 114, 179, 230, 521, 525, 532, 583, 584, 585 (17, 18, 30, 82, 83, 85, 104).
		Alnus rugosa var. americana (Regel) Fern.

Pathogen	Disease	Host
Taphrina robinsoniana Giesenh. (Concl'd.)		Alnus species 55, 195, 583, 584, 585 (19, 84, 85).
		Betula alleghaniensis Britt. 38 (83).
Taphrina species	Leaf blister	Betula alleghaniensis Britt. 539 (81).
		Betula papyrifera Marsh. 154.
		Populus tremuloides Michx. 308, 620, 621 (73).
Taphrina species prob. americana Mix	Leaf blister	Betula papyrifera Marsh. 84 (95).

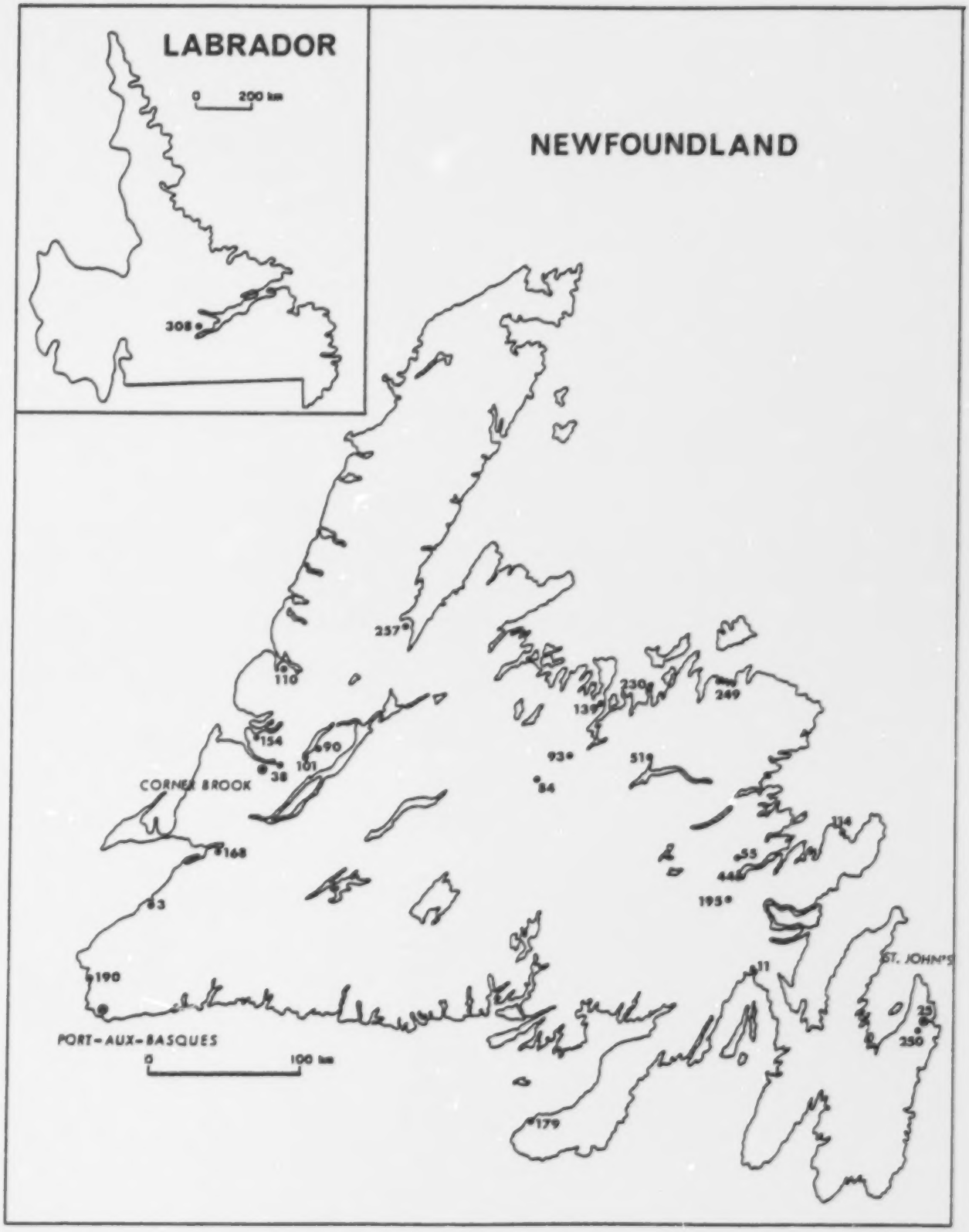

Fig. 13. Map showing 24 locations where leaf blisters of broadleaved trees, shrubs or herbaceous plants were collected.

Foliage Diseases of Broadleaved Trees, Shrubs or Herbaceous Plants - Mildews

Pathogen	Disease	Host
Phyllactinia guttata (Fr.) Lév.	Powdery mildew	*Alnus* species
		Salix discolor Muhl.
Podosphaera clandestina (Wallr. ex Fr.) Lév.	Powdery mildew	*Amelanchier* species
Uncinula salicis (D.C. ex Mérat) Wint.	Powdery mildew	*Salix discolor* Muhl.

Foliage Diseases of Broadleaved Trees, Shrubs or Herbaceous Plants - Miscellaneous

Pathogen	Disease	Host
Fusicladium saliciperdum (All. and Tub.) Lind. (= Pollacia saliciperda (All. and Tub.) Arx)	Willow blight (scab)	Salix species 10, 25, 34, 77, 90, 120, 121, 160, 297, 308, 580, 583, 584, 585, 621 (4, 19, 25, 71, 82, 85, 134, 143, 167, 169, 171).
Guignardia aesculi V.B. Stewart	Leaf blotch	Aesculus hippocastanum L. 25 (31).
Physalospora miyabeana Fukushi	Willow blight (black canker)	Salix pentandra L. 25 (169, 171).
		Salix species 10, 25, 297, 308, 580, 582, 583, 621 (1, 4, 71).
Pollacia elegans Serv.	Leaf and shoot blight	Populus alba L. 25, 583, 584 (171, 172).
		Populus balsamifera L. 24, 25, 84, 92, 109, 116, 250, 291, 582, 583, 584 (1, 10, 23, 72, 77, 172).
		Populus species 24, 25, 84, 90, 92, 93, 109, 167, 583, 584, 585 (5, 13, 17, 45, 82).
		Populus tremuloides Michx. 11, 12, 14, 15, 16, 22, 24, 28, 44, 54, 55, 63, 66, 68, 77, 84, 91, 92, 93, 104, 109, 113, 122, 133, 139, 159, 165, 168, 176, 180, 226, 511, 517, 532, 540, 541, 542, 563, 564, 583, 584, 585, 590 (4, 8, 13, 15, 17, 18, 42, 44, 47, 48, 53, 65, 78, 79, 81, 82, 83, 84, 112, 115, 116).

Pathogen	Disease	Host
Venturia macularis (Fr.) Müll. and Arx (= Pollacia radiosa (Lib.) Bald. and Cif.)	Leaf and shoot blight	Populus balsamifera L. 121, 141, 159, 540 (19, 85). Populus species 7, 14, 56, 66, 68, 77, 84, 92, 93, 94, 97, 101, 109, 121, 146, 153, 156, 159, 167, 176, 180, 296, 300, 517, 580, 583, 584, 585, 621, 628, 647 (9, 13, 17, 45, 77, 82, 167, 171, 172). Populus tremuloides Michx. 7, 11, 12, 14, 15, 16, 21, 22, 24, 26, 28, 35, 44, 47, 51, 54, 55, 62, 63, 66, 67, 68, 77, 82, 84, 87, 90, 91, 92, 93, 94, 103, 104, 109, 113, 121, 122, 123, 124, 125, 133, 139, 152, 153, 158, 159, 165, 168, 169, 172, 175, 176, 180, 185, 195, 226, 231, 269, 270, 281, 285, 296, 299, 302, 304, 308, 328, 504, 511, 517, 532, 540, 541, 542, 552, 563, 564, 577, 580, 582, 583, 584, 585, 590, 611, 612, 619, 621, 625, 637 (1, 4, 5, 6, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 27, 28, 29, 32, 33, 34, 35, 36, 37, 40, 42, 44, 47, 48, 53, 62, 65, 68, 69, 70, 71, 72, 73, 73A, 75, 76, 77, 78, 79, 81, 82, 83, 84, 85, 86, 87, 88, 91, 92, 93, 95, 104, 112, 115, 116, 117, 119, 121, 122, 123, 128, 131, 132, 134, 135, 137, 138, 139, 144, 169, 171).

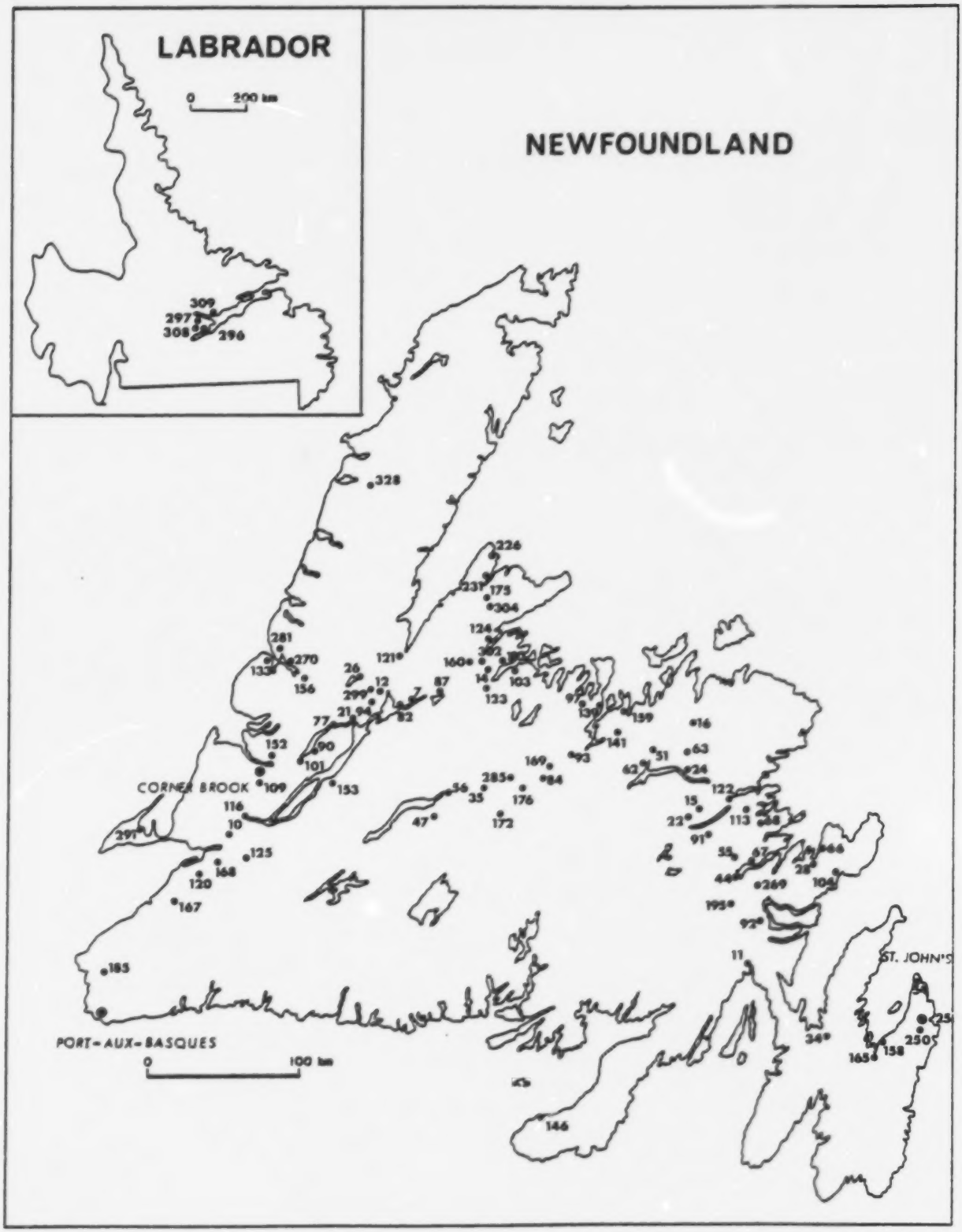

Fig. 14. Map showing 84 locations where miscellaneous foliage diseases of broadleaved trees, shrubs or herbaceous plants were collected.

Phanerogamic Parasites - Dwarf Mistletoe

Pathogen	Disease	Host
Arceuthobium pusillum Peck.	Dwarf mistletoe	Picea mariana (Mill.) B.S.P. 10, 14, 21, 22, 35, 37, 53, 77, 81, 84, 87, 89, 95, 98, 122, 125, 153, 155, 180, 191, 197, 282, 283, 313, 502, 504, 544, 545, 576, 583, 584, 585 (1, 2, 3, 4, 5, 6, 16, 17, 18, 19, 20, 21, 23, 24, 29, 32, 33, 34, 35, 36, 37, 48, 49, 51, 53, 57, 59, 68, 69, 70, 71, 72, 73, 73A, 83, 84, 85, 86, 87, 88, 90, 91, 92, 104, 125, 126, 127, 130, 131, 132, 134, 135, 137, 139, 143, 144, 152, 167, 171).

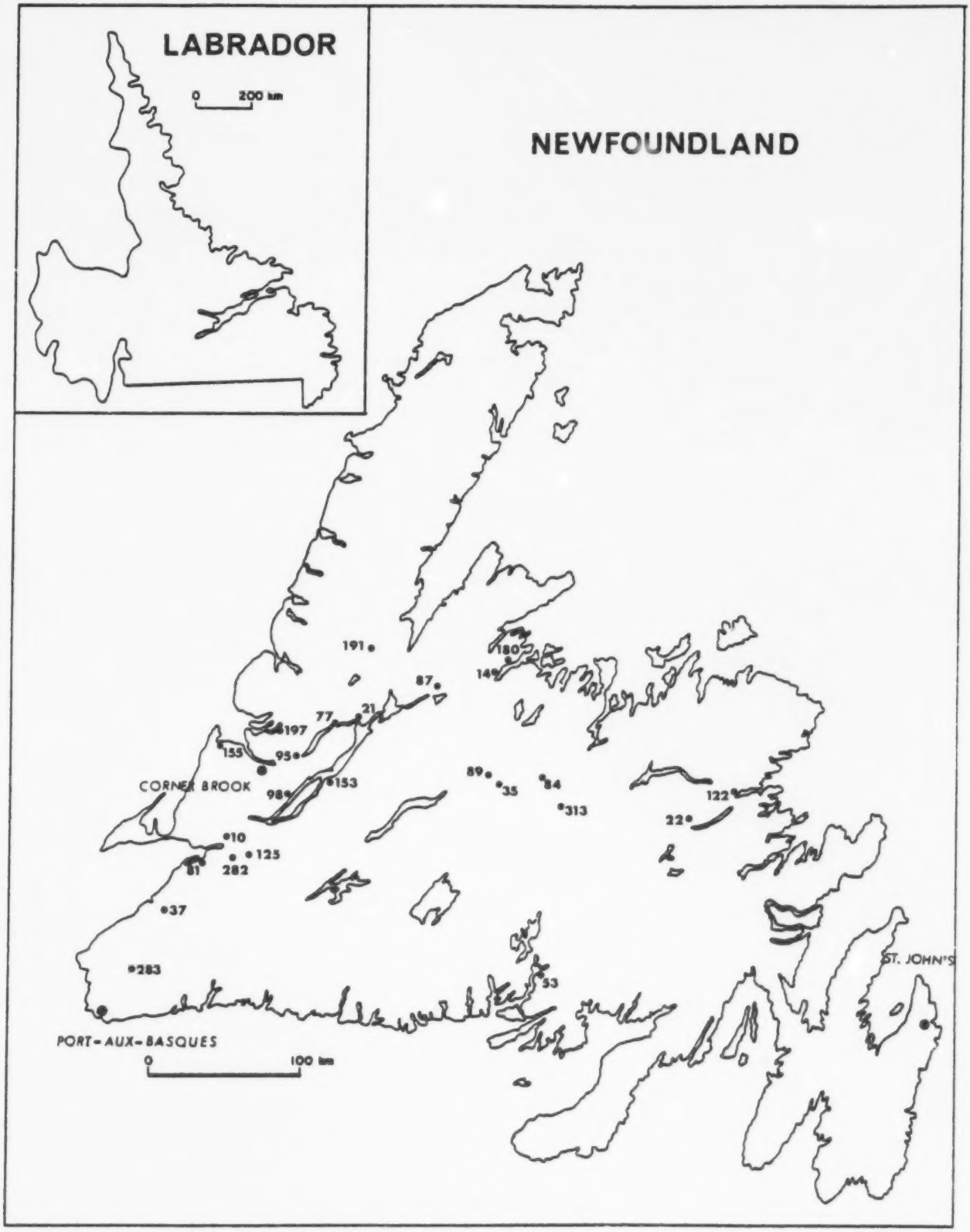

Fig. 15. Map showing 24 locations where dwarf mistletoe was collected.

NON-INFECTIOUS DISEASES

Causal Agent	Damage	Host
Animal	Animal damage - browsing, breaking and deformation	Abies balsamea (L.) Mill. 2, 7, 12, 19, 20, 21, 23, 35, 53, 55, 56, 57, 67, 77, 79, 81, 87, 93, 94, 96, 98, 109, 113, 116, 122, 124, 127, 133, 138, 149, 153, 160, 162, 169, 172, 189, 191, 197, 200, 231, 232, 233, 234, 235, 236, 237, 546, 547, 548, 549, 550, 561, 562, 576, 582 (52, 54, 55, 61, 63, 64, 68, 83, 89, 90, 93, 104, 109). Abies species 5, 9. Acer spicatum Lam. 7, 20, 94, 127, 149, 172, 547, 562 (63). Amelanchier species 7, 20, 94, 127, 149, 172, 547, 562 (63). Betula papyrifera Marsh. 2, 7, 12, 19, 20, 21, 23, 35, 53, 55, 56, 57, 77, 79, 81, 87, 93, 94, 96, 98, 109, 113, 116, 124, 127, 133, 138, 149, 153, 160, 162, 169, 172, 189, 191, 197, 199, 200, 231, 232, 233, 234, 235, 236, 237, 546, 547, 548, 549, 550, 561, 562, 576, 582 (54, 55, 61, 63, 64, 89, 90, 93, 104, 164). Cornus species 7, 20, 94, 127, 149, 172, 547, 562 (63). Larix leptolepis (Sieb. and Zucc.) Gord. 6.

Causal Agent	Damage	Host
Animal (Cont'd.)		Nemopanthus mucronata (L.) Trel. 7, 20, 94, 127, 149, 172, 547, 562 (63). Picea abies (L.) Karst. 1, 4, 6, 49, 136, 143, 144, 145, 146. Picea glauca (Moench) Voss 7, 10, 20, 94, 127, 149, 172, 547, 562 (63). Picea mariana (Mill.) B.S.P. 7, 20, 55, 56, 67, 94, 122, 127, 149, 172, 311, 547, 562, 583, 584, 619 (3, 63, 68, 70). Picea sitchensis (Bong.) Carr. 1, 4, 6. Pinus banksiana Lamb. 49, 56, 65, 122, 136, 143, 144, 145, 146 (68, 164). Pinus resinosa Ait. 1, 49, 55, 136, 143, 144, 145, 146, 172, 583, 584, 619 (3, 70). Pinus species 560 (95). Pinus sylvestris L. 49, 136, 143, 144, 145, 146, 179 (164). Populus tremuloides Michx. 7, 20, 84, 94, 127, 149, 172, 547, 562 (10, 63, 77). Prunus pensylvanica L.f. 7, 20, 94, 127, 149, 172, 547, 562 (63).

Causal Agent	Damage	Host
Animal (Concl'd.)		Pseudotsuga menziesii (Mirb.) Franco 6.
		Salix species 7, 20, 94, 127, 149, 172, 547, 562 (63).
		Sorbus americana Marsh 7, 20, 94, 127, 149, 172, 189, 237, 547, 562 (63, 90).
		Sorbus species
		Taxus canadensis Marsh. 7, 20, 94, 127, 149, 172, 547, 562 (63).
		Viburnum cassinoides L. 7, 20, 94, 127, 149, 172, 547, 562 (63).
Chemical	Fume damage	Abies balsamea (L.) Mill. 10, 138, 583 (39, 75, 76, 118, 120).
		Alnus rugosa var. americana (Regel) Fern. 10, 138 (75).
		Betula papyrifera Marsh. 10, 138 (75).
		Larix species 138 (76).
		Picea glauca (Moench) Voss 138 (39, 76, 118, 120).
		Picea mariana (Mill.) B.S.P. 10, 138, 583 (39, 75, 76, 118, 120).

Causal Agent	Damage	Host
Chemical (fumes)	Fumes from pulp and paper mill - death of foliage and young shoots	Betula papyrifera Marsh. (on trees) 84, 109, 169 (19, 20, 49, 50, 85, 86).
		Larix laricina (Du Roi) K. Koch (on trees) 84, 169 (20, 50, 85, 86).
		Populus balsamifera L. 84 (85).
Chemical (herbicide)	Chemical damage - wilting of needles	Abies balsamea (L.) Mill. 83 (69).
Chemical (insecticide) - Aldrin	Chemical damage - browning of foliage and death of seedlings	Picea omorika (Pančić) Purkyne (on seedlings) 90.
		Picea sitchensis (Bong.) Carr. (on seedlings) 90.
		Populus alba L. 25 (69).
		Populus tremuloides Michx. 25 (69).
Frost	Frost damage - browning and death in late spring	Abies alba Mill. (on seedlings) 22.
	Frost damage - browning and death in spring and summer	Abies balsamea (L.) Mill. (on seedlings) 8, 9, 16, 303, 583 (8, 14, 69, 71, 72, 73, 80, 100, 105, 114, 120, 134, 144).
	Frost damage - browning and death in spring, summer, fall and winter	Abies balsamea (L.) Mill. (on trees) 4, 5, 11, 16, 17, 19, 22, 24, 25, 35, 47, 48, 52, 54, 56, 67, 77, 84, 95, 96, 98, 99, 104, 109, 121, 122, 124, 127, 128, 133,

Causal Agent	Damage	Host
Frost (Cont'd.)		162, 172, 193, 194, 214, 223, 238, 240, 241, 269, 288, 296, 303, 308, 309, 316, 330, 504, 516, 517, 520, 571, 580, 582, 583, 584, 585, 592, 595, 613, 616, 619, 621, 636, 643 (4, 6, 7, 9, 10, 11, 12, 19, 24, 25, 33, 35, 36, 39, 49, 57, 58, 68, 69, 70, 73, 73A, 74, 75, 76, 77, 78, 79, 85, 86, 87, 88, 89, 90, 91, 93, 104, 112, 114, 118, 121, 122, 123, 125, 127, 128, 131, 132, 135, 137, 138, 139, 171, 172).
	Frost damage - browning and death in late spring	Abies species (on seedlings and trees) 8, 9, 19, 22, 96, 172, 194, 583, 584, 636 (14, 80, 100, 114, 169).
	Frost damage - browning and death in late spring	Abies veitchii Lindl. 9 (100, 114).
	Frost damage - browning and death in early summer	Acer spicatum Lam. (on trees) 2, 37, 602 (82, 104).
	Frost cracks	Aesculus hippocastanum L. 25 (72).
	Frost damage - browning and death in early summer	Coniferous and deciduous trees and shrubs 24, 25, 43, 84, 90, 109, 232, 250, 329, 330, 583, 584, 585, 595, 644 (169, 171, 172).
	Frost damage - browning and death in late spring	Fagus species (on trees) 25.
	Frost damage - browning and death in late spring	Larix laricina (Du Roi) K. Koch (on seedlings) 24, 84, 90, 580, 582, 583, 584 (4, 6, 42, 73A).

Causal Agent	Damage	Host
Frost (Cont'd.)	Frost damage - browning and death in late spring, summer, fall and winter	Larix laricina (Du Roi) K. Koch (on trees) 11, 25, 35, 52, 56, 122, 127, 128, 520 (36, 71, 85, 91, 125).
	Frost damage - browning and death in late spring	Larix leptolepis (Sieb. and Zucc.) Gord. (on seedlings) 22.
	Frost damage - browning and death in spring and late summer	Larix occidentalis Nutt. (on seedlings) 22, 131 (13, 42, 79).
	Frost damage - browning and death in spring and late summer	Larix species (on seedlings) 24, 25, 34, 67, 152.
	Frost damage - browning and death in late spring	Picea abies (L.) Karst. (on seedlings) 6, 90 (9, 35, 39, 42, 76, 119).
	Frost damage - browning and death in summer, fall and winter	Picea glauca (Moench) Voss (on trees) 4, 6, 19, 35, 53, 56, 77, 84, 90, 95, 96, 109, 121, 133, 172, 194, 223, 241, 583, 584, 585 (9, 24, 35, 39, 57, 76, 85, 86, 90, 93, 114, 119).
	Frost damage - browning and death in late spring	Picea jezoensis (Sieb. and Zucc.) Carr. (on seedlings) 22.
	Frost damage - browning and deformation in late summer	Picea mariana (Mill.) B.S.P. (on cones) 6, 191, 323 (170).
	Frost damage - browning and death in late spring	Picea mariana (Mill.) B.S.P. (on seedlings) 22, 24, 84, 133, 326 (6, 33, 73, 104, 105, 134, 171).

Causal Agent	Damage	Host
Frost (Cont'd.)	Frost damage - browning and death in spring and summer	Picea mariana (Mill.) B.S.P. (on trees) 6, 17, 18, 19, 25, 26, 35, 56, 84, 96, 122, 127, 128, 172, 194, 580, 582, 583, 584, 636 (4, 5, 10, 33, 35, 36, 39, 68, 70, 73, 73A, 74, 75, 76, 77, 79, 85, 86, 88, 93, 114, 118, 121, 122, 125, 127, 128, 137, 139, 169, 171).
	Frost damage - browning and death in late spring	Picea sitchensis (Bong.) Carr. (on seedlings) 6, 35, 90, 617 (5, 9, 39, 42, 73, 76, 119, 128).
	Frost damage - browning and death in late spring	Picea species (on seedlings) 22.
	Frost damage - browning and death in late spring	Picea species (on trees) 19, 24, 25, 35, 47, 53, 56, 67, 96, 122, 127, 128, 133, 172, 180, 269, 296, 504, 520, 571, 580, 582, 583, 584, 585, 593, 613, 616, 619, 621, 636 (25, 88, 91, 100, 169).
	Frost damage - browning and death in late spring	Pinus banksiana Lamb. (on seedlings) 90 (42).
	Frost damage - browning and death in late fall	Pinus nigra var. poiretiana (Ant.) Aschers. and Graebn. (on seedlings) 22.
	Frost damage - browning and death in summer	Populus nigra var. italica Muenchh. (on trees) 64 (71).
	Frost damage - cracks, browning and death in summer	Populus tremuloides Michx. (on trees) 24, 84, 580, 582, 584, 585 (6).

Causal Agent	Damage	Host
Frost (Concl'd.)	Frost damage - browning and death in late summer	Prunus pensylvanica L.f. (on trees) 47, 56, 57, 67, 83, 133, 285, 293 (73).
	Frost damage - browning and death in late spring	Thuja occidentalis L. (on seedlings) 90 (42).
	Frost damage - browning and death in late spring	Thuja plicata D. Don (on seedlings) 90.
Heat Injury	Heat damage	Acer rubrum L. 25, 584 (6, 36, 69, 71).
		Acer saccharinum L. 25 (69).
		Acer spicatum Lam. 584 (6, 36).
		Aesculus hippocastanum L. 25 (69).
		Alnus rugosa var. americana (Regel) Fern. 9, 268, 584 (6, 36, 71, 123).
		Coniferous and deciduous trees and shrubs 25, 67, 84, 580, 583, 584, 585 (123, 135).
		Larix species 67, 185, 272 (73, 74, 123).
		Populus alba L. 25 (69).
		Populus nigra var. italica Muenchh. 25 (69).

Causal Agent	Damage	Host
Heat Injury (Concl'd.)		Populus tremuloides Michx. 87 (73A, 123, 135).
		Sorbus species 24, 25.
Heaving	Heaving-uprooting and death of seedlings	Abies nordmanniana (Stev.) Spach. 22.
		Larix leptolepis (Sieb. and Zucc.) Gord. 22.
		Larix species 551 (96).
		Picea mariana (Mill.) B.S.P. 69, 582 (96, 107).
		Picea species 551 (96).
		Pinus densiflora Sieb. and Zucc. 22.
		Pinus species 551 (96).
Late Spring Leaf Scorch		Acer spicatum Lam. 25, 583, 585 (39, 118, 120, 122).
		Prunus pensylvanica L.f. 112 (73).
		Sorbus aucuparia L. 583, 585 (39, 74, 118, 122).
Lichens		Abies balsamea (L.) Mill. 223 (69).
		Acer pseudoplatanus L. 25 (70).

Causal Agent	Damage	Host
Lichens (Concl'd.)		Acer rubrum L. 25 (70).
		Aesculus hippocastanum L. 25 (70).
		Picea glauca (Moench) Voss 90 (69).
		Prunus pensylvanica L.f. 25 (70).
Physical Injury	Improperly braced trees	Populus nigra var. italica Muenchh. 25 (69).
Roadside Damage		Abies balsamea (L.) Mill. 63, 67, 125, 576, 583, 584 (36, 37, 75).
		Alnus rugosa var. americana (Regel) Fern. 298, 576, 583, 584 (37, 73, 75).
		Betula alleghaniensis Britt. 63, 125 (36, 75).
		Betula papyrifera Marsh. 25, 63, 67, 125, 576, 583, 584 (36, 37, 70, 75).
		Picea mariana (Mill.) B.S.P. 63, 67, 125, 576, 583, 584 (36, 37, 75).
		Pinus sylvestris L. 25.
		Populus tremuloides Michx. 583, 584 (75).
Salt	Salt injury	Juniperus species 59.
		Picea mariana (Mill.) B.S.P. 59, 595 (104).

Causal Agent	Damage	Host
Salt (Concl'd.)		Pinus sylvestris L. 583, 584 (75).
Snow and Ice	Snow and ice damage - breakage and killing	Abies balsamea (L.) Mill. 21, 25, 34, 35, 38, 48, 69, 77, 80, 90, 92, 107, 109, 116, 131, 134, 137, 138, 140, 153, 176, 242, 314, 315, 551, 552, 553, 554, 577, 580, 581, 582, 583, 584, 631, 632, 635 (20, 21, 50, 51, 78, 79, 86, 87, 100, 110, 112, 168, 169). Betula papyrifera Marsh. 21, 25, 34, 38, 69, 77, 90, 97, 109, 129, 130, 141, 142, 552, 555, 557, 558, 633, 634 (18, 48, 78, 84, 104, 110, 112, 168). Fraxinus nigra Marsh. 582, 584. Larix laricina (Du Roi) K. Koch 21, 25, 34, 38, 69, 77, 80, 90, 92, 107, 109, 129, 130, 137, 138, 141, 142, 314, 315, 551, 552, 557, 558, 580, 581, 582, 583, 584, 631, 632, 635 (18, 21, 48, 51, 78, 79, 84, 87, 104, 110, 112, 168). Picea mariana (Mill.) B.S.P. 21, 25, 34, 38, 48, 69, 77, 80, 90, 92, 97, 107, 109, 129, 130, 138, 140, 141, 142, 314, 315, 551, 552, 555, 557, 558, 577, 580, 581, 582, 583, 584, 631, 632, 635 (18, 48, 78, 79, 84, 110, 112, 168, 169). Picea sitchensis (Bong.) Carr. 4, 6, 25 (100).

Causal Agent	Damage	Host
Snow and Ice (Concl'd.)		Picea species 25, 34, 48, 69, 92, 107, 138 (21, 51, 87, 100, 110).
		Pinus banksiana Lamb. 582, 584.
		Pinus resinosa Ait. 1, 25, 113 (100).
		Pinus species 25, 135, 136, 253 (168).
		Pinus sylvestris L. 582, 584.
		Populus tremuloides Michx. 25, 34, 69, 97, 109, 129, 130, 141, 142, 552, 555, 557, 558, 577 (18, 48, 84, 104, 110, 112, 168).
Unknown Factor	Purple foliage	Larix laricina (Du Roi) K. Koch 90.
Water Excess	Water excess injury - asphyxiation	Picea glauca (Moench) Voss 10 (100).
Weather Damage		Acer spicatum Lam. 583, 585.
		Coniferous and deciduous trees and shrubs 583, 584, 585.
		Sorbus americana Marsh 583, 585.
Wind Damage		Coniferous and deciduous trees and shrubs 583, 584 (33, 70, 73A, 137).

Causal Agent	Damage	Host
Winter	Winter drying	Abies balsamea (L.) Mill. 6, 10, 14, 20, 25, 34, 38, 39, 44, 48, 53, 63, 64, 66, 77, 79, 83, 84, 86, 88, 90, 92, 94, 96, 101, 104, 106, 109, 110, 116, 119, 123, 131, 132, 133, 134, 135, 138, 151, 153, 156, 164, 166, 171, 176, 182, 185, 188, 193, 196, 197, 198, 199, 223, 228, 240, 243, 244, 245, 246, 256, 261, 270, 271, 275, 276, 277, 278, 279, 280, 284, 286, 289, 293, 294, 308, 309, 310, 327, 502, 506, 509, 516, 519, 541, 543, 556, 576, 580, 581, 582, 583, 584, 585, 594, 602, 612, 639 (1, 3, 4, 5, 6, 7, 8, 9, 10, 18, 19, 20, 24, 32, 33, 34, 37, 38, 39, 48, 49, 50, 57, 58, 68, 69, 70, 71, 72, 73, 73A, 74, 75, 76, 77, 84, 85, 86, 88, 90, 91, 104, 106, 118, 120, 121, 122, 123, 125, 127, 132, 137, 138, 139, 143, 144, 171, 172). Acer spicatum Lam. 90, 292, 293, 299, 622, 623 (73A). Betula papyrifera Marsh. 24, 29, 79, 110, 193, 583, 584, 585 (37, 122). Betula pendula Roth. 6, 20, 196, 240, 284. Coniferous and deciduous trees and shrubs 25, 238, 645 (167, 172). Juniperus species 25 (171).

Causal Agent	Damage	Host
Winter (Cont'd.)		Larix laricina (Du Roi) K. Koch 44, 92, 138, 198, 543, 581, 582, 583, 584, 585, 612 (6, 36, 73A, 85, 125, 127). Larix leptolepis (Sieb. and Zucc.) Gord. 6, 20, 196, 240, 284 (76). Larix occidentalis Nutt. 20, 22, 196, 240, 284 (9). Picea glauca (Moench) Voss 6, 20, 193, 196, 240, 284 (9, 39, 90, 118). Picea mariana (Mill.) B.S.P. (on seedlings and trees) 6, 20, 22, 24, 29, 34, 79, 84, 96, 109, 110, 185, 193, 196, 199, 240, 271, 284, 285, 289, 562, 576, 582, 583, 584, 585, 612 (1, 3, 7, 8, 9, 32, 33, 37, 38, 39, 68, 73A, 75, 76, 104, 118, 119, 120, 122, 137, 144). Pinus banksiana Lamb. (on seedlings) 90, 179, 188, 576, 582, 584 (6, 73A, 76, 86, 125). Pinus nigra var. poiretiana (Ant.) Aschers. and Graebn. 22. Pinus resinosa Ait. 6, 20, 25, 113, 122, 135, 136, 196, 240, 284, 576, 582 (3, 9, 20, 24, 33, 39, 50, 57, 76, 86, 89, 90, 123, 134, 137). Pinus species 44, 92, 135, 136, 179, 188, 198, 253, 543 (20, 50, 57, 85, 90).

Causal Agent	Damage	Host
Winter (Concl'd.)		*Pinus strobus* L. 24, 29, 79, 86, 193, 199, 254, 272, 275, 294, 581, 582, 583, 584, 585 (37, 38, 73, 120, 122, 125, 127, 134). *Pinus sylvestris* L. 6, 20, 25, 35, 84, 86, 109, 135, 136, 188, 196, 199, 240, 272, 284, 506, 576, 581, 582, 583, 584, 585 (1, 3, 8, 9, 24, 32, 33, 38, 39, 68, 70, 73, 73A, 89, 105, 118, 121, 122, 123, 125, 127, 135, 137, 143, 144). *Populus* species 24, 29, 79, 193, 583, 584, 585 (37, 122). *Populus tremuloides* Michx. 90, 292, 293, 299, 622, 623 (73A, 125). *Prunus pensylvanica* L.f. 581, 582 (125). *Thuja* species 25 (171).

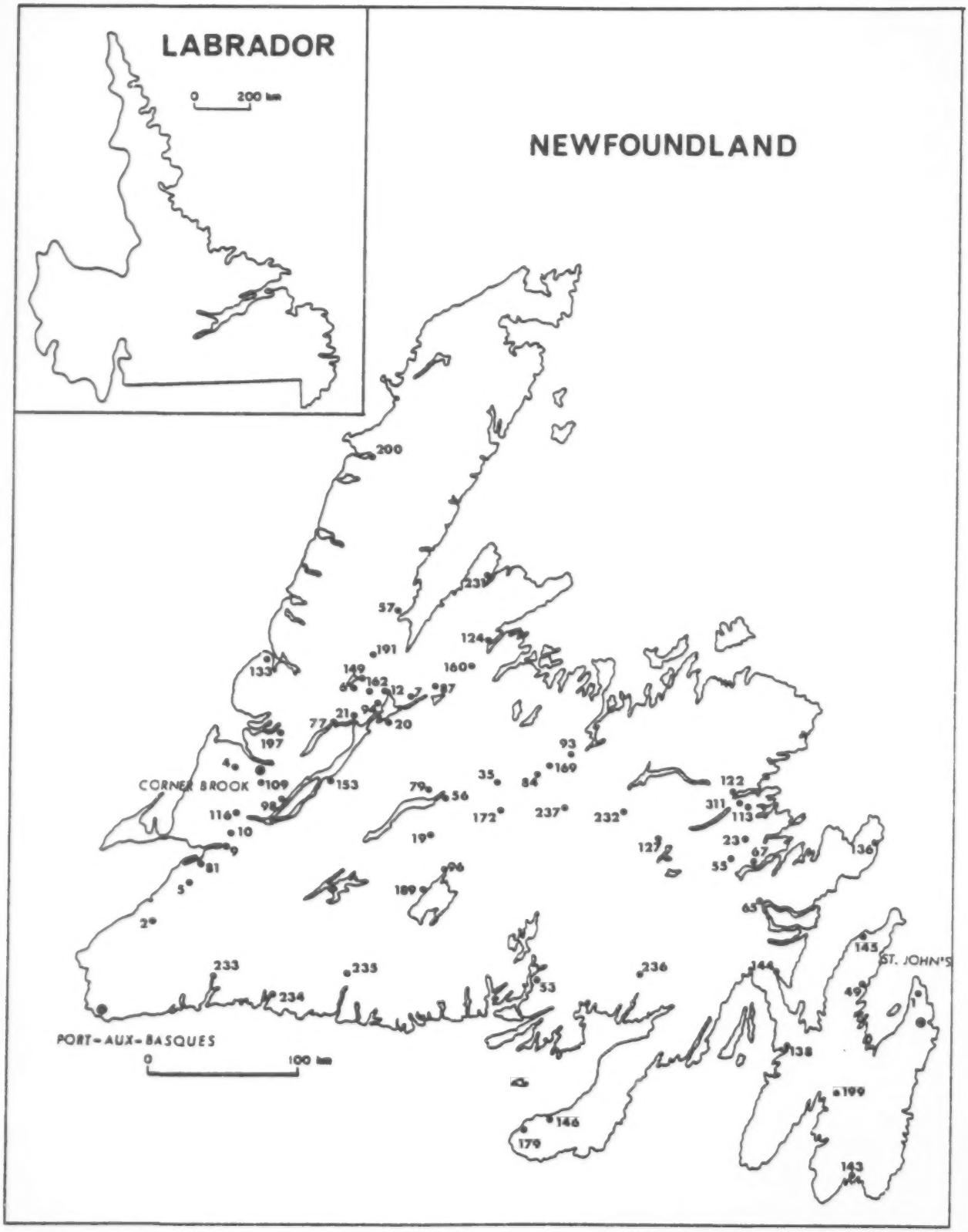

Fig. 16. Map showing 63 locations where animal damage was observed.

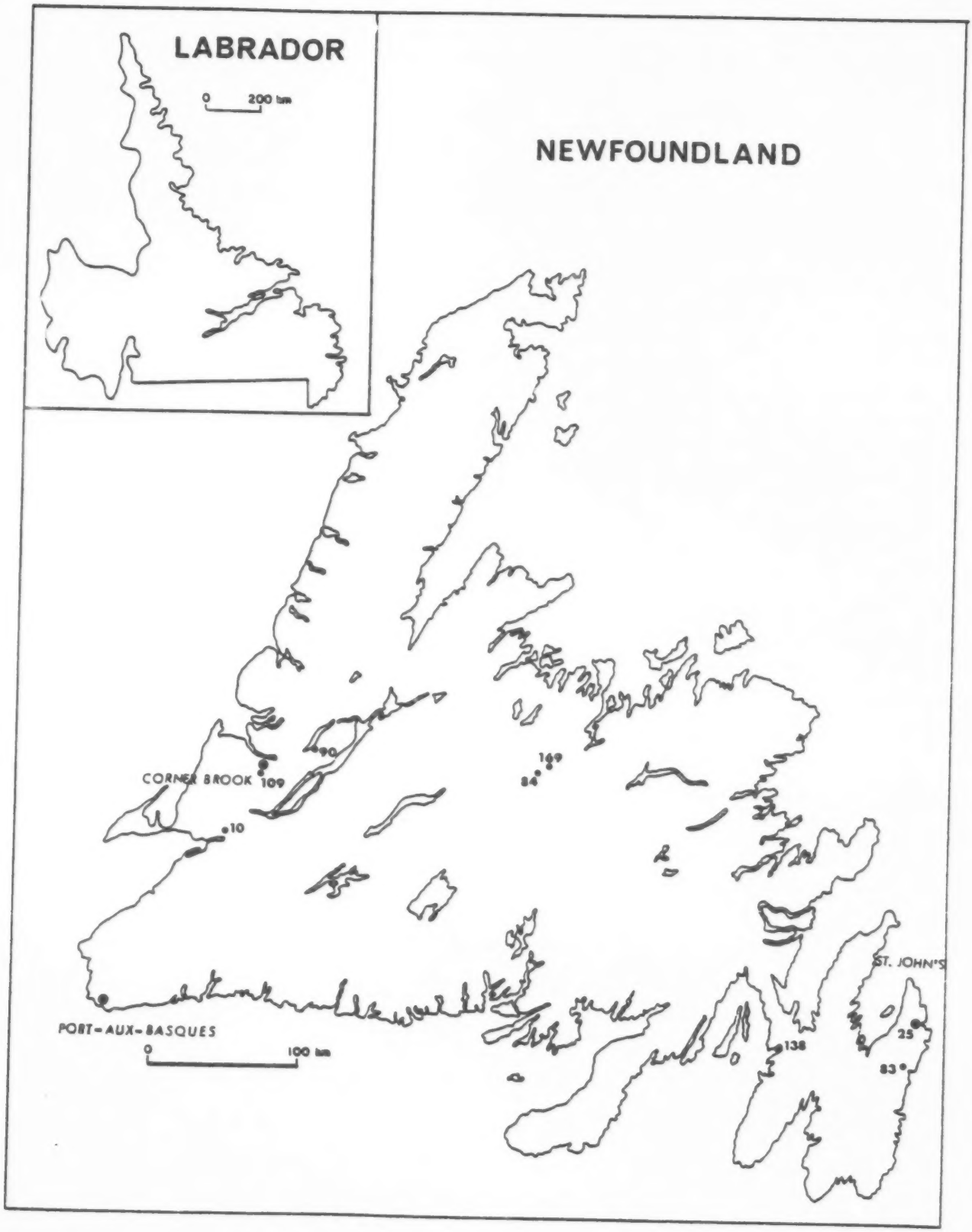

Fig. 17. Map showing eight locations where chemical damage was observed.

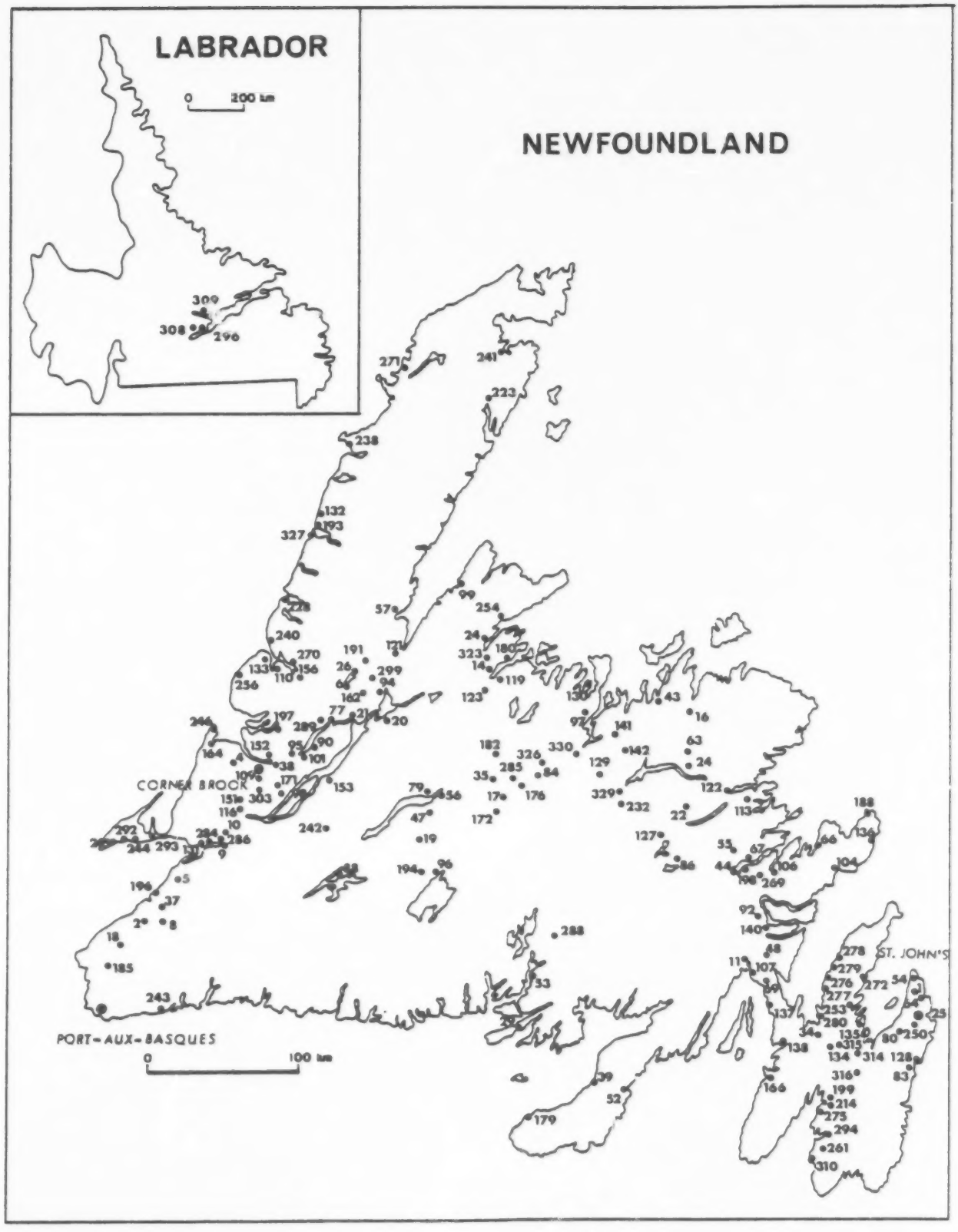

Fig. 18. Map showing 155 locations where frost, heaving, snow and ice, wind damage, weather damage, and winter drying were observed.

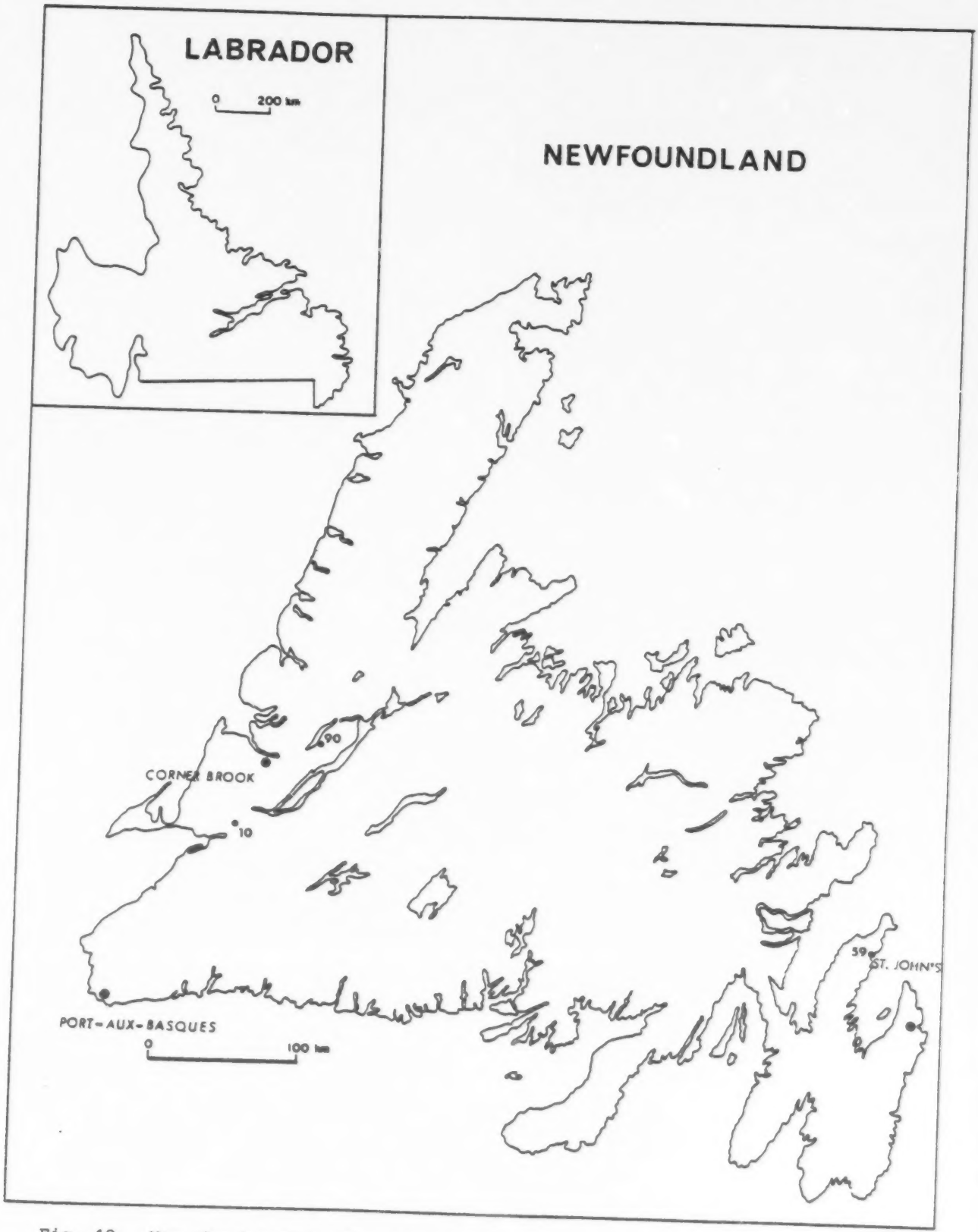

Fig. 19. Map showing three locations where salt, unknown and water excess damage were observed.

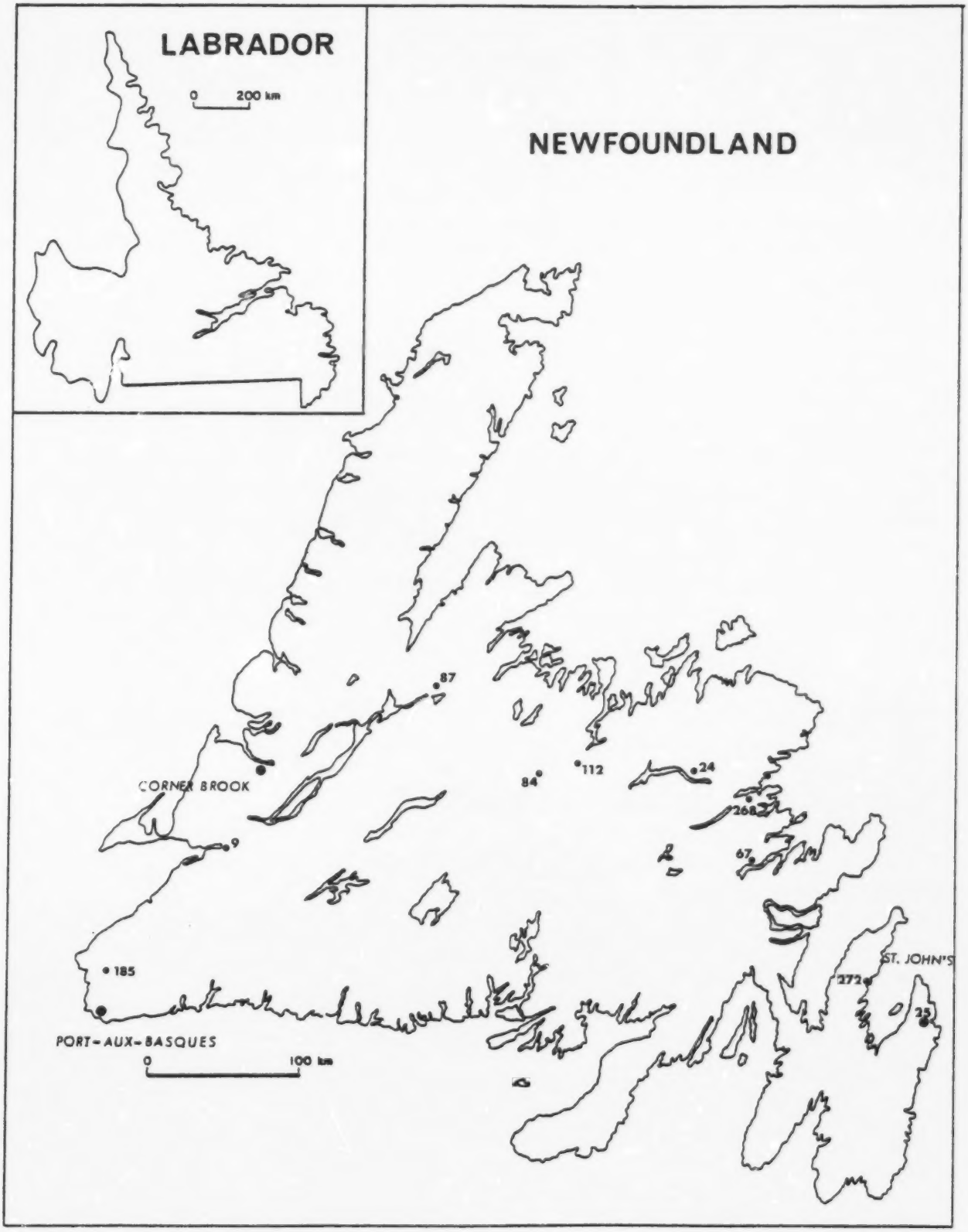

Fig. 20. Map showing 10 locations where late spring leaf scorch and heat damage were observed.

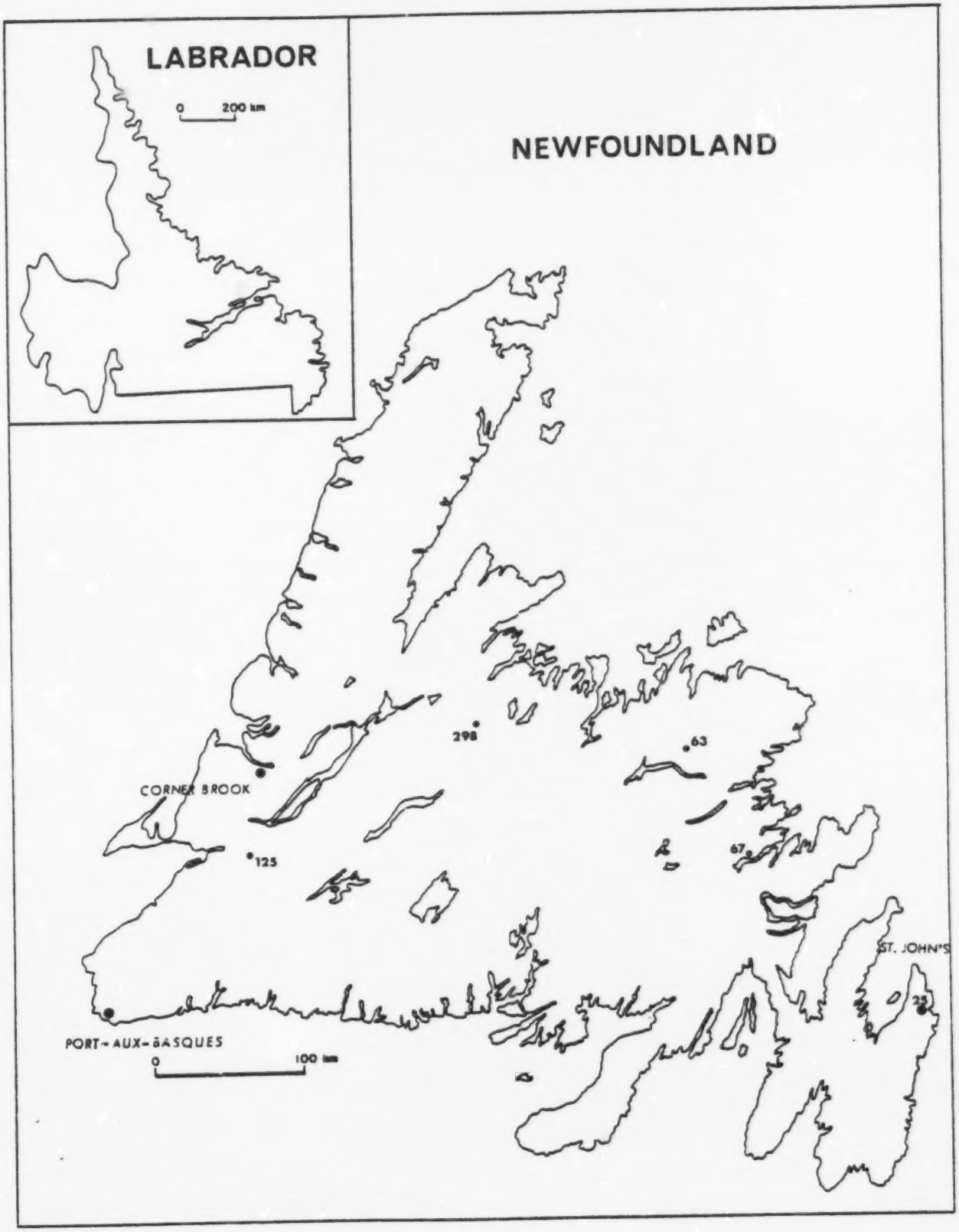

Fig. 21. Map showing five locations where physical injury and roadside damage were observed.

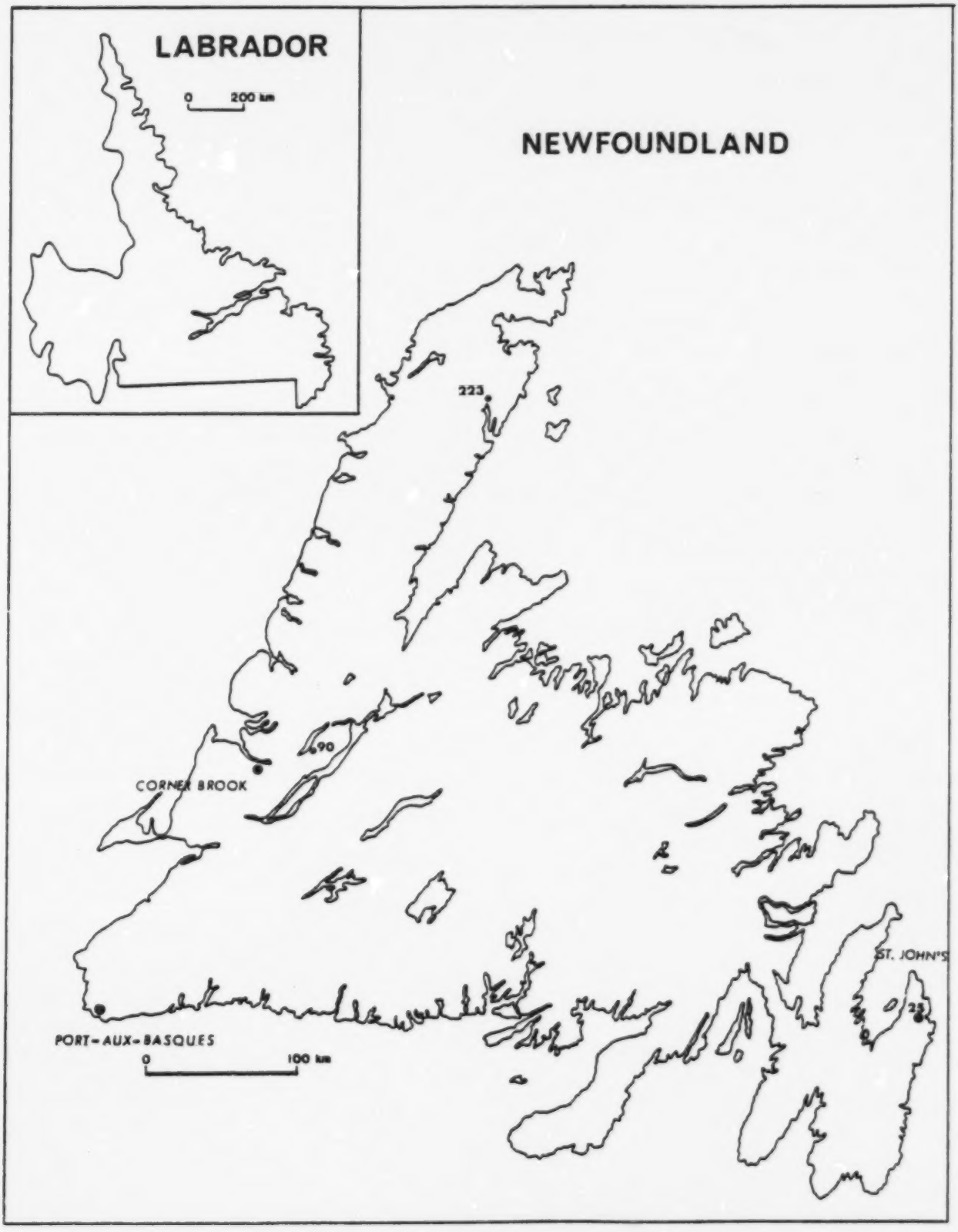

Fig. 22. Map showing three locations where lichens were observed.

PREFACE TO HOST INDEX

In this index, the hosts are arranged alphabetically by their scientific names, followed by the appropriate common name with its abbreviation in parenthesis. The pathogenic fungi, phanerogamic parasites, animals and abiotic factors causing different types of damage are also arranged alphabetically under their appropriate hosts regardless of their taxonomic status.

HOST INDEX

ABIES ALBA Mill., silver fir (sF)

Frost

On seedlings (in late spring)

ABIES BALSAMEA (L.) Mill., balsam fir (bF)

Aleurodiscus amorphus (Pers. ex Fr.) Schroet.

Alternaria tenuis auct. sensu. Wiltshire

Animal

Armillaria mellea (Vahl ex Fr.) Kummer

Bothrodiscus pinicola Shear

Cephalosporium species

Ceratocystis species

Chemical

Fume damage

Herbicide

Chlorosplenium aeruginosum (Oed. ex S.F. Gray) de Not.

Coniophora puteana (Schum. ex Fr.) Karst.

Coriolellus heteromorphus (Fr.) Bond. and Singer

Coriolellus species (? heteromorphus or variiformis)

Corticium galactinum (Fr.) Burt

Corticium pini-canadensis (Schw.) Jacks. and Rogers

Creonectria cucurbitula (Sacc.) Seav.

Daedalea species

Dermea balsamea (Pk.) Seav.

Fomes pini (Brot. ex Fr.) Karst.

Fomes pinicola (Sw. ex Fr.) Cke.

Frost

On seedlings (in spring and summer)

On trees (in spring, summer, fall and winter)

Fusicoccum abietinum (Hartig) Prill. and Del.

Hymenochaete tabacina (Sow. ex Fr.) Lév.

Isthmiella faullii (Darker) Darker

Kirschsteiniella thujina (Pk.) Pomerleau and Etheridge

Lenzites saepiaria (Wulf. ex Fr.) Fr.

Lenzites species

Lichens

Lirula nervata (Darker) Darker

Lophodermium species

Melampsorella caryophyllacearum Schroet.

Meliola pinicola Dearn.

Milesia fructuosa Faull

Milesia species

Nectria species

Odontia bicolor (A. and S.) Bres.

Phaeocryptopus nudus (Pk.) Petrak

Polyporus abietinus Dicks. ex Fr.

Polyporus balsameus Pk.

Polyporus biformis Klotsch ex Fr.

Polyporus mollis Pers. ex Fr.

Polyporus species

Poria candidissima (Schw.) Cke.

Pucciniastrum epilobii Otth

Pucciniastrum goeppertianum (Kühn) Kleb.

Rehmiellopsis balsameae Waterman

Retinocyclus abietis (Crouan) Groves and Wells

Rhizosphaera abietis Mang. and Har.

Rhizothyrium abietis Naum.

Roadside damage

Schizophyllum commune Fr.

Snow and ice

Stereum chailletii (Pers. ex Fr.) Fr.

Stereum sanguinolentum (Alb. and Schw. ex Fr.) Fr.

Stereum species

Trametes species

Uredinopsis species

Winter

ABIES HOLOPHŸLLA Maxim, needle fir

Armillaria mellea (Vahl ex Fr.) Kummer

ABIES HOMŌLEPIS Sieb. and Zucc., Nikko fir

Armillaria mellea (Vahl ex Fr.) Kummer

ABIES MARIÈSII Mast., Maries fir

Armillria mellea (Vahl ex Fr.) Kummer

ABIES MAYRIÂNA Myiabe and Kudo

Armillaria mellea (Vahl ex Fr.) Kummer

ABIES NORDMANNIANA (Stev.) Spach., caucasian or Nordmann's fir

Heaving

ABIES SACHALINÉNSIS Mast., Saghalin fir

Armillaria mellea (Vahl ex Fr.) Kummer

ABIES SPECIES, fir (F)

Animal

Armillaria mellea (Vahl ex Fr.) Kummer

Frost

On seedlings and trees (in late spring)

ABIES VEÎTCHII Lindl., Veitch's silver fir or Veitch fir

Armillaria mellea (Vahl ex Fr.) Kummer

Frost

On seedlings (in late spring)

ACER PSEUDOPLATANUS L., sycamore maple (-M)

Lichens

Nectria cinnabarina Tode ex Fr.

Nectria galligena Bres.

ACER RUBRUM L., red maple (rM)

Cladosporium humile Davis

Cytospora species

Heat injury

Kabatiella apocrypta (Ell. and Ev.) Arx

Lichens

Mycosphaerella species

Nectria cinnabarina Tode ex Fr.

Nectria species

Phyllosticta minima (Berk. and Curt.) Underw. and Earle

Rhytisma acerinum (Pers.) Fr.

ACER SACCHARINUM L., silver maple (siM)

Heat injury

Nectria cinnabarina Tode ex Fr.

Nectria species

ACER SACCHARUM Marsh, sugar maple (sM)

Nectria cinnabarina Tode ex Fr.

ACER SPECIES, maple (M)

Kabatiella apocrypta (Ell. and Ev.) Arx

Nectria cinnabarina Tode ex Fr.

Rhytisma acerinum (Pers.) Fr.

Rhytisma punctatum (Pers.) Fr.

ACER SPICATUM Lam., mountain maple (moM)

Animal

Cytospora species

Frost

On trees (in early summer)

Gymnosporangium cornutum Arth. and Kern

Heat injury

Hymenochaete tabacina (Sow. ex Fr.) Lév.

Hypoxylon multiforme Fr.

Kabatiella apocrypta (Ell. and Ev.) Arx

Late spring leaf scorch

Nectria cinnabarina Tode ex Fr.

Nectria species

Phleospora aceris (Lib.) Sacc.

Phyllosticta minima (Berk. and Curt.) Underw. and Earle

Rhytisma acerinum (Pers.) Fr.

Rhytisma punctatum (Pers.) Fr.

Weather damage

Winter

AESCULUS HIPPOCASTANUM L., horse chestnut

Frost cracks

Guignardia aesculi V.B. Stewart

Heat injury

Lichens

Nectria cinnabarina Tode ex Fr.

Nectria species

Pleurotus species

ALNUS CRISPA (Ait.) Pursh, green alder (gAl)

Nectria coccinea (Pers. ex Fr.) Fr.

Peniophora species

ALNUS RUGOSA (Du Roi) Spreng., speckled alder (spAl)

Chlorosplenium aeruginosum (Oed. ex S.F. Gray) de Not.

Cytospora species

Hypoxylon fuscum Pers. ex Fr.

Hypoxylon mammatum (Wahl.) Miller

Peniophora aurantiaca (Bres.) Höhn. and Litsch.

Peniophora species

Polyporus versicolor L. ex Fr.

Taphrina robinsoniana Giesenh.

ALNUS RUGOSA var. AMERICANA (Regel) Fern., speckled alder (spAl)

Chemical

Fume damage

Heat injury

Hymenochaete tabacina (Sow. ex Fr.) Lév.

Peniophora aurantiaca (Bres.) Höhn. and Litsch.

Roadside damage

Schizophyllum commune Fr.

Taphrina robinsoniana Giesenh.

ALNUS SPECIES, alder (Al)

Corticium leucoxanthum Bres.

Cytidia salicina (Fr.) Burt

Hymenochaete tabacina (Sow. ex Fr.) Lév.

Hypoxylon mammatum (Wahl.) Miller

Panus stipticus (Bull. ex Fr.) Fr.

Peniophora aurantiaca (Bres.) Höhn. and Litsch.

Phyllactinia guttata (Fr.) Lév.

Polyporus albellus Pk.

Poria ferrea (Pers.) Bourd. and Galz.

Poria species

Stereum ochraceoflavum (Schw.) Ell.

Stereum rugosum Fr.

Taphrina robinsoniana Giesenh.

AMELANCHIER BARTRAMIANA (Tausch) Roem., bartram's serviceberry (bSe)

Gymnosporangium species

AMELANCHIER LAEVIS Wieg., allegheny serviceberry (aSe)

Gymnosporangium species

AMELANCHIER SANGUINEA (Pursh) D.C., roundleaf serviceberry (rSe)

Gymnosporangium species

AMELANCHIER SPECIES, serviceberry (Se)

Animal

Apiosporina collinsii (Schw.) Höhn.

Gymnosporangium clavipes (Cke. and Pk.) Cke. and Pk.

Gymnosporangium species

Podosphaera clandestina (Wallr. ex Fr.) Lév.

Puccinia sparganioides Ell. and Barth.

BETULA ALLEGHANIENSIS Britt., yellow birch (yB)

Fomes fomentarius (L. ex Fr.) Kickx

Fomes igniarius (L. ex Fr.) Kickx

Hypoxylon multiforme Fr.

Polyporus albellus Pk.

Roadside damage

Taphrina carnea Johans.

Taphrina robinsoniana Giesenh.

Taphrina species

BETULA PAPYRIFERA MARSH., white birch (wB)

Animal

Armillaria mellea (Vahl ex Fr.) Kummer

Chemical

Fume damage

Fumes from pulp and paper mill

Cylindrosporium betulae Davis

Daedalea unicolor Bull. ex Fr.

Diatrype betulina Pk.

Fomes fomentarius (L. ex Fr.) Kickx

Fomes igniarius (L. ex Fr.) Kickx

Fomes pinicola (Sw. ex Fr.) Cke.

Fomes robustus Karst.

Fomes species

Ganoderma applanatum (Pers. ex Wallr.) Pat.

Gloeosporium species

Hymenochaete tabacina (Sow. ex Fr.) Lév.

Hypoxylon multiforme Fr.

Kabatiella apocrypta (Ell. and Ev.) Arx

Melampsoridium betulinum (Fr.) Kleb.

Panus laevis Berk. and Curt.

Panus stipticus (Bull. ex Fr.) Fr.

Peniophora aspera (Pers.) Sacc.

Peniophora species

Polyporus albellus Pk.

Polyporus arcularis Batsch ex Fr.

Polyporus betulinus Bull. ex Fr.

Polyporus brumalis Pers. ex Fr.

Polyporus pargamenus Fr.

Polyporus pubescens Schum. ex Fr.

Polyporus velutinus Fr.

Polyporus versicolor L. ex Fr.

Pycnoporus cinnabarinus (Jacq. ex Fr.) Karst.

Roadside damage

Schizophyllum commune Fr.

Septoria betulae (Lib.) West.

Snow and ice

Stereum hirsutum (Willd. ex Fr.) S.F. Gray

Stereum ostrea Blume and Nees ex Fr.

Stereum purpureum (Pers. ex Fr.) Fr.

Stereum rugosum Fr.

Taphrina carnea Johans.

Taphrina species

Taphrina species prob. americana Mix

Winter

BETULA PENDULA Roth., weeping birch

Winter

BETULA SPECIES, birch (B)

Polyporus pubescens Schum. ex Fr.

Polyporus versicolor L. ex Fr.

Pycnoporus cinnabarinus (Jacq. ex Fr.) Karst.

CONIFEROUS AND DECIDUOUS TREES AND SHRUBS

Frost

On trees and shrubs (in early summer)

Heat injury

Weather damage

Wind damage

Winter

CONIFEROUS WOOD AND SLASH

Corticium galactinum (Fr.) Burt

Corticium sulphureum (Pers. ex Fr.) Fr.

CORNUS CANADENSIS L., bunchberry, dwarf cornel or dwarf dogwood (dDo)

Puccinia porphyrogenita Curt.

CORNUS SPECIES, dogwood (Do)

Animal

Elsinoë corni Jenk. and Bot.

CORYLUS CORNUTA Marsh., beaked hazelnut

Gnomoniella coryli (Batsch ex Fr.) Sacc.

EPILOBIUM ANGUSTIFOLIUM L., great willow herb or fireweed

Mycosphaerella species

Pucciniastrum epilobii Otth

FAGUS SPECIES, beech (Be)

Frost

On trees (in late spring)

Nectria species

FRAXINUS NIGRA Marsh., black ash (bAs)

Snow and ice

FRAXINUS SPECIES, ash (As)

Mycosphaerella species

JUNIPERUS COMMUNIS L., common juniper (-J)

Gymnosporangium clavipes (Cke. and Pk.) Cke. and Pk.

JUNIPERUS SPECIES, juniper (J)

Salt

Winter

KALMIA ANGUSTIFOLIA L., sheep laurel

Mycosphaerella colorata (Pk.) Earle

LABURNUM ANAGUIROIDES Medic., golden chain

Nectria cinnabarina Tode ex Fr.

LARIX LARICINA (Du Roi) K. Koch, tamarack (tL)

Armillaria mellea (Vahl ex Fr.) Kummer

Chemical

Fumes from pulp and paper mill

Frost

On seedlings (in late spring)

On trees (in late spring, summer, fall and winter)

Hypodermella laricis Tub.

Melampsora medusae Thüm.

Snow and ice

Unknown (purple foliage)

Winter

LARIX LEPTOLEPIS (Sieb. and Zucc.) Gord., Japanese larch (jL)

Animal

Armillaria mellea (Vahl ex Fr.) Kummer

Frost

On seedlings (in late spring)

Heaving

Hypodermella laricis Tub.

Hypodermella species

Winter

LARIX OCCIDENTALIS Nutt., western larch (wL)

Frost

On seedlings (in spring and late summer)

Winter

LARIX SPECIES, larch (L)

Chemical

Fume damage

Frost

On seedling (in spring and late summer)

Heat injury

Heaving

LEDUM SPECIES, Labrador tea

Mycosphaerella species

NEMOPANTHUS MUCRONATA (L.) Trel., mountain holly

Animal

PICEA ABIES (L.) Karst., Norway spruce (nS)

Animal

Armillaria mellea (Vahl ex Fr.) Kummer

Frost

On seedlings (in late spring)

PICEA GLAUCA (Moench) Voss, white spruce (wS)

Animal

Armillaria mellea (Vahl ex Fr.) Kummer

Chemical

Fume damage

Chrysomyxa arctostaphyli Diet.

Chrysomyxa empetri Schroet. ex Cummins

Chrysomyxa ledi de Bary

Chrysomyxa ledicola Lagerh.

Chrysomyxa pirolata Wint.

Chrysomyxa species

Fomes pini (Brot. ex Fr.) Karst.

Fomes pinicola (Sw. ex Fr.) Cke.

Frost

On trees (in summer, fall and winter)

Isthmiella crepidiformis (Darker) Darker

Lichens

Lirula macrospora (Hartig) Darker

Lophodermium species

Meliola pinicola Dearn.

Polyporus picipes Fr.

Polyporus schweinitzii Fr.

Polyporus tomentosus Fr.

Poria species

Water excess

Winter

PICEA JEZOENSIS (Sieb. and Zucc.) Carr., hondo or yezo spruce

Frost

On seedlings (in late spring)

PICEA MARIANA (Mill.) B.S.P., black spruce (bS)

Animal

Arceuthobium pusillum Peck.

Armillaria mellea (Vahl ex Fr.) Kummer

Chemical

Fume damage

Chrysomyxa arctostaphyli Diet.

Chrysomyxa empetri Schroet. ex Cummins

Chrysomyxa ledi de Bary

Chrysomyxa ledicola Lagerh.

Chrysomyxa pirolata Wint.

Chrysomyxa species

Coriolellus variiformis (Pk.) Sarkar

Corticium notabile Jackson

Fomes pini (Brot. ex Fr.) Karst.

Fomes pinicola (Sw. ex Fr.) Cke.

Fomes species

Frost

On cones (in late summer)

On seedlings (in late spring)

On trees (in spring and summer)

Ganoderma applanatum (Pers. ex Wallr.) Pat.

Heaving

Isthmiella crepidiformis (Darker) Darker
Lenzites saepiaria (Wulf. ex Fr.) Fr.
Lenzites species
Lirula macrospora (Hartig) Darker
Meliola pinicola Dearn.
Peniophora septentrionalis Laurila
Phacidium infestans Karst.
Phacidium species
Polyporus abietinus Dicks. ex Fr.
Polyporus adustus Willd. ex Fr.
Polyporus schweinitzii Fr.
Polyporus species
Polyporus tomentosus Fr.
Poria candidissima (Schw.) Cke.
Poria species
Roadside damage
Salt
Sirococcus strobilinus Preuss
Snow and ice
Winter

PICEA OMORIKA (Pančić) Purkyne, Serbian spruce
Chemical
Insecticide - Aldrin

PICEA PUNGENS Engelm., Colorado blue spruce
Chrysomyxa ledicola Lagerh.
Cytospora kunzei Sacc.
Nectria species

PICEA RUBENS Sarg., red spruce (rS)
Armillaria mellea (Vahl ex Fr.) Kummer

PICEA SITCHENSIS (Bong.) Carr., sitka spruce (SS)

Animal

Armillaria mellea (Vahl ex Fr.) Kummer

Chemical

Insecticide - Aldrin

Chrysomyxa ledicola Lagerh.

Frost

On seedlings (in late spring)

Snow and ice

PICEA SITCHENSIS X GLAUCA

Armillaria mellea (Vahl ex Fr.) Kummer

PICEA SPECIES, spruce (S)

Armillaria mellea (Vahl ex Fr.) Kummer

Chrysomyxa empetri Schroet. ex Cummins

Chrysomyxa ledi de Bary

Chrysomyxa ledicola Lagerh.

Chrysomyxa species

Corticium galactinum (Fr.) Burt

Corticium laeve Pers. ex Fr.

Corticium pelliculare Karst.

Fomes pini (Brot. ex Fr.) Karst.

Frost

On seedlings (in late spring)

On trees (in late spring)

Heaving

Hymenochaete tabacina (Sow. ex Fr.) Lév.

Isthmiella crepidiformis (Darker) Darker

Lenzites saepiaria (Wulf. ex Fr.) Fr.

Lophodermium species

Peniophora gigantea (Fr.) Massee

Peniophora separans Burt

Phacidium infestans Karst.

Polyporus abietinus Dicks. ex Fr.

Polyporus borealis Fr.

Polyporus fibrillosus Karst.

Polyporus semipileatus Pk.

Snow and ice

Stereum sanguinolentum (Alb. and Schw. ex Fr.) Fr.

PINUS BANKSIANA Lamb., jack pine (jP)

Animal

Coleosporium asterum (Diet.) Syd.

Cronartium coleosporioides Arth.

Dothistroma pini Hulb.

Frost

On seedlings (in late spring)

Gremmeniella abietina (Lagerb.) Morelet

Lophodermium pinastri (Schrad. ex Fr.) Chev.

Snow and ice

Winter

PINUS DENSIFLORA Sieb. and Zucc., Japanese red pine

Heaving

PINUS NIGRA Arn., Austrian pine

Diplodia pinea (Desm.) Kickx

Dothistroma pini Hulb.

Gremmeniella abietina (Lagerb.) Morelet

PINUS NIGRA var. POIRETIANA (Ant.) Aschers. and Graebn., corsican pine

Frost

On seedlings (in late fall)

Winter

PINUS RESINOSA Ait., red pine (rP)

Animal

Armillaria mellea (Vahl ex Fr.) Kummer

Coleosporium asterum (Diet.) Syd.

Dothistroma pini Hulb.

Gremmeniella abietina (Lagerb.) Morelet

Lophodermium pinastri (Schrad. ex Fr.) Chev.

Snow and ice

Winter

PINUS SPECIES, pine (P)

Animal

Heaving

Lophodermium pinastri (Schrad. ex Fr.) Chev.

Lophodermium species

Snow and ice

Winter

PINUS STROBUS L., eastern white pine (ewP)

Armillaria mellea (Vahl ex Fr.) Kummer

Coleosporium asterum (Diet.) Syd.

Cronartium ribicola J.C. Fischer

Cucurbidothis pityophila (Fr.) Petrak

Lophodermium nitens Darker

Lophodermium pinastri (Schrad. ex Fr.) Chev.

Polyporus species

Polyporus tomentosus var. circinatus (Fr.) Sartory and Maire

Tympanis pithya (Fr.) Karst.

Winter

PINUS SYLVESTRIS L., Scots pine (scP)

Animal

Armillaria mellea (Vahl ex Fr.) Kummer

Coleosporium asterum (Diet.) Syd.

Dothistroma pini Hulb.

Gremmeniella abietina (Lagerb.) Morelet

Lophodermium pinastri (Schrad. ex Fr.) Chev.

Lophodermium species

Roadside damage

Salt

Snow and ice

Winter

POPULUS ALBA L., silver poplar (sPo)

Chemical

Insecticide - Aldrin

Heat injury

Pollacia elegans Serv.

POPULUS BALSAMIFERA L., balsam poplar (bPo)

Chemical

Fumes from pulp and paper mill

Cytospora chrysosperma (Pers.) Fr.

Cytospora species

Fomes igniarius var. laevigatus (Fr.) Overh.

Ganoderma applanatum (Pers. ex. Wallr.) Pat.

Pollacia elegans Serv.

Septoria musiva Peck.

Venturia macularis (Fr.) Müll. and Arx

POPULUS NIGRA L., black poplar (-Po)

Taphrina populina Fr.

POPULUS NIGRA var. ITALICA Muenchh., Lombardy poplar (LPo)

Cytospora chrysosperma (Pers.) Fr.

Dothichiza populea Sacc. and Briard

Frost

On trees (in summer)

Heat injury

Marssonina brunnea (Ell. and Ev.) Sacc.

Phyllosticta species

Physical injury

Taphrina populina Fr.

POPULUS SPECIES, poplar (Po)

Cytospora chrysosperma (Pers.) Fr.

Peniophora polygonia (Pers. ex Fr.) Bourd. and Galz.

Phlebia strigosozonata (Schw.) Lloyd

Pollacia elegans Serv.

Polyporus adustus Willd. ex Fr.

Polyporus elegans Bull. ex Fr.

Polyporus pargamenus Fr.

Polyporus versicolor L. ex Fr.

Schizophyllum commune Fr.

Stereum purpureum (Pers. ex Fr.) Fr.

Taphrina populina Fr.

Tympanis spermatiospora (Nyl.) Nyl.

Venturia macularis (Fr.) Müll. and Arx

Winter

POPULUS TREMULOIDES Michx., trembling aspen (tA)

Animal

Chemical

Insecticide - Aldrin

Ciborinia whetzelii (Seav.) Seav.

Cladosporium subsessile Ell. and Barth.

Cytospora chrysosperma (Pers.) Fr.

Encoelia fascicularis fide Groves

Fomes igniarius (L. ex Fr.) Kickx

Frost

On trees (in summer)

Heat injury

Hymenochaete tabacina (Sow. ex Fr.) Lév.
Melampsora abietis-canadensis Ludwig ex Arth.
Melampsora epitea Thüm.
Melampsora species
Mycosphaerella species
Panus stipticus (Bull. ex Fr.) Fr.
Peniophora polygonia (Pers. ex Fr.) Bourd. and Galz.
Peniophora populnea (Pk.) Burt
Peniophora rufa (Fr.) Boid.
Peniophora species
Pollacia elegans Serv.
Polyporus adustus Willd. ex Fr.
Polyporus brumalis Pers. ex Fr.
Polyporus hirsutus Wulf. ex Fr.
Polyporus pargamenus Fr.
Polyporus velutinus Fr.
Poria species
Roadside damage
Schizophyllum commune Fr.
Snow and ice
Stereum purpureum (Pers. ex Fr.) Fr.
Taphrina populina Fr.
Taphrina species
Trechispora brinkmanni (Bres.) Rogers and Jacks.
Tympanis spermatiospora (Nyl.) Nyl.
Venturia macularis (Fr.) Müll. and Arx
Winter

PRUNUS AVIUM (L.) L., sweet cherry
Apiosporina morbosa (Schw.) Arx

PRUNUS DOMESTICA L., common plum
Apiosporina morbosa (Schw.) Arx

PRUNUS INSITITIA L., damson plum

Apiosporina morbosa (Schw.) Arx

PRUNUS PENSYLVANICA L.f., pin cherry (pCh)

Animal

Apiosporina morbosa (Schw.) Arx

Armillaria mellea (Vahl ex Fr.) Kummer

Coccomyces hiemalis Higgins

Cylindrosporium species

Cytospora chrysosperma (Pers.) Fr.

Fomes fomentarius (L. ex Fr.) Kickx

Frost

On trees (in late summer)

Late spring leaf scorch

Lichens

Nectria cinnabarina Tode ex Fr.

Polyporus albellus Pk.

Polyporus brumalis Pers. ex Fr.

Polyporus pocula (Schw.) Berk. and Curt.

Polyporus versicolor L. ex Fr.

Stereum hirsutum (Willd. ex Fr.) S.F. Gray

Taphrina cerasi (Fckl.) Sadeb.

Winter

PRUNUS SPECIES, cherry (Ch)

Apiosporina morbosa (Schw.) Arx

Coccomyces hiemalis Higgins

Hymenochaete tabacina (Sow. ex Fr.) Lév.

Peniophora aspera (Pers.) Sacc.

Poria prunicola (Murr.) Sacc. and Trott.

Taphrina confusa (Atk.) Gies.

Tympanis spermatiospora (Nyl.) Nyl.

PRUNUS VIRGINIANA L., choke cherry (cCh)

Apiosporina morbosa (Schw.) Arx

Coccomyces hiemalis Higgins

Taphrina confusa (Atk.) Gies.

PSEUDOTSUGA MENZIESII (Mirb.) Franco, Douglas fir or pine douglas (D)

Animal

Armillaria mellea (Vahl ex Fr.) Kummer

PYROLA SPECIES, pyrola

Melampsora epitea Thüm.

PYRUS SPECIES, pear

Apiosporina collinsii (Schw.) Höhn.

RHAMNUS ALNIFOLIA L'Hér., alder-leaved buckthorn or cascara (-Ca)

Puccinia coronata Cda.

RIBES GLANDULOSUM Grauer, skunk currant

Cronartium ribicola J.C. Fischer

RIBES HIRTELLUM Michx., bristly gooseberry

Cronartium ribicola J.C. Fischer

RIBES LACUSTRE (Pers.) Poir., black currant

Cronartium ribicola J.C. Fischer

RIBES SPECIES, currant and gooseberry

Cronartium ribicola J.C. Fischer

ROSA SPECIES, rose

Nectria cinnabarina Tode ex Fr.

RUBUS CANADENSIS L., smooth blackberry

Gymnoconia peckiana (Howe) Trott.

RUBUS SPECIES, brambles or blackberries

Gymnoconia peckiana (Howe) Trott.

SALIX BABYLONICA L., weeping willow

Cytospora species

SALIX BEBBIANA Sarg., bebb or long-beaked willow (beW)

Melampsora abieti-capraearum Tub.

SALIX DISCOLOR Muhl., large pussy willow (puW)

Cercospora salicina Ell. and Ev.

Cytospora salicis (Cda.) Rabh.

Melampsora abieti-capraearum Tub.

Melampsora epitea Thüm.

Phyllactinia guttata (Fr.) Lév.

Rhytisma salicinum (Pers.) Fr.

Uncinula salicis (D.C. ex Mérat) Wint.

SALIX PENTANDRA L., laurel or bay leaf willow

Physalospora miyabeana Fukushi

SALIX SPECIES, willow (W)

Animal

Cercospora salicina Ell. and Ev.

Coniophora puteana (Schum. ex Fr.) Karst.

Cytospora chrysosperma (Pers.) Fr.

Cytospora salicis (Cda.) Rabh.

Fomes igniarius (L. ex Fr.) Kickx

Fusicladium saliciperdum (All. and Tub.) Lind.

Hymenochaete tabacina (Sow. ex Fr.) Lév.

Hypoxylon mammatum (Wahl.) Miller

Melampsora abieti-capraearum Tub.

Melampsora epitea Thüm.

Melampsora paradoxa Diet. and Holw.

Melampsora species

Physalospora miyabeana Fukushi

Polyporus elegans Bull. ex Fr.

Polyporus nidulans Fr.

Rhytisma salicinum (Pers.) Fr.

SAMBUCUS PUBENS Michx., catberry, red elderberry or scarlet elder (-El)

Nectria cinnabarina Tode ex Fr.

SAMBUCUS SPECIES, elder

Nectria cinnabarina Tode ex Fr.

Rhytisma species

SOLIDAGO SPECIES, goldenrod

Coleosporium asterum (Diet.) Syd.

SORBUS AMERICANA Marsh, American mountain ash or dogberry (aMo)

Animal

Gymnosporangium cornutum Arth. and Kern

Gymnosporangium species

Mycosphaerella species

Phyllosticta minima (Berk. and Curt.) Underw. and Earle

Poria ferrea (Pers.) Bourd. and Galz.

Weather damage

SORBUS AUCUPARIA L., European mountain ash (eMo)

Gymnosporangium species

Late spring leaf scorch

Mycosphaerella species

SORBUS DECORA (Sarg.) Schneid., showy mountain ash (sMo)

Daedalea confragosa Bolt. ex Fr.

Gymnosporangium cornutum Arth. and Kern

Gymnosporangium species

Nectria cinnabarina Tode ex Fr.

SORBUS SPECIES, mountain ash (Mo)

Animal

Gymnosporangium cornutum Arth. and Kern

Heat injury

Hypoxylon multiforme Fr.

Mycosphaerella species

Pycnoporus cinnabarinus (Jacq. ex Fr.) Karst.

TAXUS BREVIFOLIA Nutt., western yew (-Y)

Nectria cinnabarina Tode ex Fr.

TAXUS CANADENSIS Marsh., Canada yew or ground hemlock (-Y)

Animal

Sphaerulina taxicola (Pk.) Berl.

THALICTRUM POLYGAMUM Muhl., muskrat weed

Puccinia recondita Rob. ex Desm.

THUJA OCCIDENTALIS L., eastern white cedar (eC)

Frost

On seedlings (in late spring)

Phomopsis juniperovora Hahn.

THUJA PLICATA D. Don, western red cedar (wC)

Frost

On seedlings (in late spring)

THUJA SPECIES, cedar (C)

Winter

TILIA SPECIES, basswood (Ba)

Nectria cinnabarina Tode ex Fr.

ULMUS GLABRA var. CAMPERDOWNII Rehd., camperdown elm

Phleospora ulmi (Fr.) Wallr.

ULMUS PARVIFOLIA Jacq., Chinese elm (cE)

Nectria cinnabarina Tode ex Fr.

ULMUS SPECIES, elm (E)

Gnomonia ulmea (Schw.) Thüm.

VACCINIUM CESPITOSUM Michx., English blueberry

Pucciniastrum goeppertianum (Kühn) Kleb.

VACCINIUM SPECIES, cranberries and blueberries

Ramularia effusa Pk.

VIBURNUM CASSINOIDES L., wild raisin

Animal

Apiosporina collinsii (Schw.) Höhn.

PREFACE TO GENERAL INDEX

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APPENDIX I

Names, Latitudes and Longitudes of Localities Cited in the Maps and in the Disease Index

Locality number	Name of locality	Latitude	Longitude
1	Bauline Line	47° 40' N	52° 48' W
2	Codroy Pond - Codroy Valley	48° 05' N	58° 52' W
3	St. Fintans	48° 11' N	58° 51' W
4	Serpentine Lake	48° 54' N	58° 09' W
5	Middle Brook	48° 20' N	58° 30' W
6	Cormack	49° 22' N	57° 19' W
7	Birchy Lake - Birchy Ridge	49° 20' N	56° 49' W
8	Highlands River	48° 05' N	58° 46' W
9	Bottom Brook	48° 32' N	58° 14' W
10	Stephenville	48° 36' N	58° 15' W
11	Swift Current	47° 53' N	54° 13' W
12	Upper Humber Region	48° 49' N	55° 57' W
13	Bonne Bay Big Pond	49° 21' N	57° 37' W
14	Halls Bay Region	49° 30' N	56° 09' W
15	North Pond Road	48° 42' N	54° 26' W
16	Barry's Brook - Gander Bay Road	49° 10' N	54° 29' W
17	Sandy Lake - Badger (11 km N of)	49° 20' N	56° 23' W
18	South Branch	47° 55' N	59° 02' W
19	Lake Ambrose	48° 34' N	56° 36' W
20	Howley, Sandy Lake Region	49° 10' N	56° 59' W
21	Howley Jct. - Main Dam (Grand Lake)	49° 12' N	57° 14' W
22	North Pond	48° 42' N	54° 33' W
23	Terra Nova Village Road	48° 30' N	54° 10' W
24	Gander	48° 56' N	54° 34' W
25	St. John's	47° 34' N	52° 43' W
26	Adies River	49° 29' N	57° 08' W
27	Flat Bay	48° 24' N	58° 35' W
28	Princeton	48° 25' N	53° 35' W
29	Hermitage	47° 33' N	55° 56' W
30	Knights Cove	48° 32' N	53° 19' W
31	Ten Mile Lake	51° 06' N	56° 37' W
32	Port Rexton	48° 23' N	53° 20' W
33	Marystown - Freshwater Pond - Fortune	47° 08' N	55° 19' W
34	Whitbourne	47° 25' N	53° 32' W
35	Badger	48° 54' N	56° 05' W
36	Long Lake	48° 29' N	57° 04' W
37	Crabbes River	48° 08' N	58° 44' W
38	Steady Brook	48° 57' N	57° 49' W
39	Frenchman's Cove, Burin Peninsula	47° 13' N	55° 24' W

Locality number	Name of locality	Latitude	Longitude
40	Elliotts Cove - Snook's Harbour Jct.	48° 09' N	53° 54' W
41	Britannia, Random Island	48° 09' N	53° 43' W
42	Birchy Lake Road	49° 22' N	56° 33' W
43	Birch Bay	49° 21' N	54° 44' W
44	Port Blandford	48° 21' N	54° 10' W
45	St. Jones Within - Hillview	48° 03' N	53° 45' W
46	Lake Ebbegunbaeg	48° 17' N	56° 23' W
47	Exploits Dam - Lake Ambrose	48° 42' N	56° 38' W
48	Goobies	47° 56' N	53° 58' W
49	Harbour Grace - Carbonear	47° 44' N	53° 13' W
50	Winterton	47° 57' N	53° 20' W
51	Glenwood	49° 00' N	54° 52' W
52	Marystown	47° 10' N	55° 10' W
53	Bay D'Espoir	47° 49' N	55° 47' W
54	Bauline Line - Pouch Cove Road	47° 44' N	52° 48' W
55	Terra Nova	48° 30' N	54° 13' W
56	Millertown	48° 49' N	56° 33' W
57	Sop's Arm, White Bay	49° 47' N	56° 52' W
58	Middle Ridge Pond	48° 16' N	55° 05' W
59	Northern Bay	47° 57' N	53° 04' W
60	Brig Bay	51° 03' N	56° 55' W
61	River of Ponds	50° 32' N	57° 23' W
62	Glenwood Forest Road	48° 12' N	54° 53' W
63	Gander Bay Road	48° 59' N	54° 29' W
64	Torbay	47° 40' N	52° 44' W
65	Milton	48° 13' N	53° 58' W
66	Plate Cove	48° 30' N	53° 30' W
67	Charlottetown Region, T.N.N.P.	48° 26' N	54° 04' W
68	Glovertown	48° 39' N	54° 01' W
69	Come By Chance River Valley	47° 48' N	53° 58' W
70	St. Veronica's	47° 56' N	55° 47' W
71	Morrisville	47° 52' N	55° 46' W
72	New Bay Pond	49° 11' N	55° 36' W
73	Brown's Arm	49° 15' N	55° 10' W
74	Park Harbour, T.N.N.P.	48° 32' N	53° 56' W
75	Millertown (18 km N of)	48° 58' N	56° 37' W
76	Cape Ray	47° 42' N	59° 16' W
77	Deer Lake - Reidville - Jct. Brook	49° 10' N	57° 25' W
78	Goulds	47° 29' N	52° 46' W
79	Buchans - Red Indian Lake	48° 50' N	56° 38' W
80	Paddy's Pond - Cochrane Pond	47° 29' N	52° 52' W
81	St. George's	48° 26' N	58° 29' W
82	Birchy and Sandy Lake Narrows	49° 18' N	56° 52' W
83	Witless Bay - Mobile	47° 17' N	52° 50' W

Locality number	Name of locality	Latitude	Longitude
84	Grand Falls	48° 55' N	55° 42' W
85	North Harbour Road	47° 53' N	54° 06' W
86	Lake St. John	48° 24' N	54° 37' W
87	Sheffield Lake	49° 22' N	56° 36' W
88	Victoria Lake	48° 21' N	57° 19' W
89	Badger - Buchans Road (8 km SW of)	48° 56' N	56° 07' W
90	Pasadena - Midland - South Brook	49° 01' N	57° 36' W
91	Gambo Lake	48° 38' N	54° 22' W
92	Clarenville	48° 10' N	53° 59' W
93	Bishop's Falls	49° 01' N	55° 29' W
94	Big Falls	49° 21' N	57° 10' W
95	Lower Humber Valley	48° 59' N	57° 50' W
96	Noel Paul's Brook	48° 32' N	56° 32' W
97	Phillips Head - Northern Arm - Point Leamington Road	49° 15' N	55° 22' W
98	North Shore, Grand Lake	48° 50' N	57° 45' W
99	Southern Arm	49° 54' N	56° 22' W
100	Western Arm	49° 49' N	56° 47' W
101	South Brook, Humber East District	49° 01' N	57° 38' W
102	Little Rapids	48° 59' N	57° 44' W
103	Robert's Arm Road	49° 27' N	55° 55' W
104	Trinity	48° 23' N	53° 23' W
105	Boat Harbour	47° 25' N	54° 51' W
106	Lethbridge	48° 21' N	53° 52' W
107	Garden Cove	47° 51' N	54° 09' W
108	Indian Bay Road	49° 05' N	54° 21' W
109	Corner Brook	48° 57' N	57° 58' W
110	Lomond - Norris Point	49° 28' N	57° 46' W
111	North Branch	48° 01' N	58° 57' W
112	Bay D'Espoir Road (8 km S of TCH)	48° 58' N	55° 25' W
113	Alexander Bay - Pine Acres	48° 42' N	54° 07' W
114	Kings Cove	48° 34' N	53° 20' W
115	Winter Brook	48° 26' N	53° 45' W
116	Gallants	48° 42' N	58° 14' W
117	Northern Portion, Bonavista Peninsula	48° 30' N	53° 10' W
118	Boat Harbour - Marystown	47° 20' N	55° 00' W
119	South Brook - Wolf Cove	49° 26' N	56° 05' W
120	Flat Bay Brook - Steel Mountain Road	48° 23' N	58° 25' W
121	Hampden -Bayside	49° 32' N	56° 54' W
122	Gambo	48° 46' N	54° 14' W
123	South Pond	49° 21' N	56° 09' W
124	Rattling Brook, Green Bay	49° 38' N	56° 10' W
125	South West Brook	48° 29' N	58° 01' W

Locality number	Name of locality	Latitude	Longitude
126	Little Barachois Brook	48° 27' N	58° 05' W
127	Triton Brook	48° 33' N	54° 47' W
128	Bay Bulls	47° 19' N	52° 49' W
129	Mount Peyton	48° 57' N	55° 06' W
130	South Arm, New Bay	49° 22' N	55° 21' W
131	Stephenville Crossing - Peilleys Brook	48° 32' N	58° 26' W
132	Bellburns	50° 20' N	57° 32' W
133	Bonne Bay	49° 30' N	57° 55' W
134	Markland	47° 23' N	53° 33' W
135	Brigus	47° 32' N	53° 13' W
136	Catalina	48° 31' N	53° 05' W
137	Little Harbour	47° 39' N	53° 56' W
138	Long Harbour	47° 26' N	53° 49' W
139	Point of Bay	49° 15' N	55° 15' W
140	Deep Bight	48° 06' N	53° 57' W
141	Notre Dame Jct.	49° 07' N	55° 05' W
142	Lake O'Brien	49° 03' N	54° 59' W
143	Trepassey	46° 44' N	53° 22' W
144	Sunnyside	47° 52' N	53° 56' W
145	New Melbourne	48° 03' N	53° 09' W
146	Grand Bank	47° 06' N	55° 45' W
147	Oasis, Grand Falls	48° 57' N	55° 46' W
148	Big Coney Arm	50° 00' N	56° 47' W
149	Adies Pond	49° 25' N	57° 14' W
150	Port au Port	48° 34' N	58° 43' W
151	Georges Lake	48° 44' N	58° 13' W
152	Hughes Brook	49° 03' N	57° 50' W
153	Grand Lake	48° 53' N	57° 25' W
154	Cox's Cove - McIvers	49° 07' N	58° 04' W
155	Blow Me Down	49° 03' N	58° 16' W
156	Wiltondale	49° 24' N	57° 37' W
157	Trout River	49° 29' N	58° 08' W
158	Seal Cove	47° 28' N	53° 04' W
159	Lewisporte	49° 15' N	55° 04' W
160	Indian River	49° 28' N	56° 18' W
161	Wild Cove	50° 00' N	56° 20' W
162	Birchy Basin	49° 23' N	57° 11' W
163	Coal Brook	47° 56' N	58° 59' W
164	York Harbour	49° 04' N	58° 23' W
165	Holyrood	47° 23' N	53° 08' W
166	Placentia	47° 15' N	53° 58' W
167	Fischels Brook	48° 17' N	58° 34' W
168	Barachois Pond Provincial Park	48° 28' N	58° 18' W

Locality number	Name of locality	Latitude	Longitude
169	Exploits River	48° 55' N	55° 40' W
170	North East River	47° 18' N	53° 47' W
171	Stag Hill	48° 52' N	57° 54' W
172	Sandy Lake - Sandy Brook, Grand Falls	48° 45' N	56° 00' W
173	N.W. River (11 km W of)	48° 24' N	54° 33' W
174	Glover Island (40 km E of)	48° 45' N	57° 04' W
175	Baie Verte Road	49° 52' N	56° 13' W
176	West Lake, Badger	48° 52' N	55° 08' W
177	Sandy Point, Grand Lake	48° 41' N	57° 54' W
178	Portugal Cove	47° 38' N	52° 51' W
179	Fortune	47° 04' N	55° 50' W
180	Springdale	49° 30' N	56° 04' W
181	Burnt Pond	49° 15' N	56° 04' W
182	Badger Brook	49° 00' N	56° 03' W
183	Deer Pond	48° 30' N	54° 48' W
184	LaScie	49° 57' N	55° 35' W
185	Doyles	47° 50' N	59° 11' W
186	Norris Arm	49° 05' N	55° 16' W
187	Benton - Square Pond Provincial Park	48° 54' N	54° 25' W
188	Bonavista	48° 39' N	53° 08' W
189	Snowshoe Pond	48° 06' N	56° 50' W
190	St. Andrews	47° 47' N	59° 16' W
191	Taylor Brook	49° 37' N	57° 02' W
192	Thornlea	47° 37' N	53° 44' W
193	Daniels Harbour	50° 14' N	57° 35' W
194	Rogerson Lake	48° 33' N	56° 45' W
195	Southwest River	48° 13' N	54° 14' W
196	Jeffreys	48° 14' N	58° 51' W
197	Goose Arm	49° 07' N	57° 55' W
198	Bunyan's Cove	48° 24' N	54° 01' W
199	Salmonier - St. Catherines	47° 12' N	53° 23' W
200	Hawkes Bay	50° 36' N	57° 11' W
201	Doctor's Brook	50° 48' N	57° 04' W
202	Great Barasway River	47° 08' N	54° 02' W
203	Eastport	48° 39' N	53° 45' W
204	John the Bay	47° 13' N	55° 04' W
205	King George IV Lake	48° 12' N	57° 54' W
206	Conne River Pond	48° 10' N	55° 29' W
207	Peter Stride's Lake	48° 09' N	57° 44' W
208	Cooks Harbour	51° 36' N	55° 52' W
209	Mount Sylvester	48° 10' N	55° 05' W
210	Bay L'Argent	47° 33' N	54° 53' W
211	Jct., St. Anthony and Cooks Harbour Road	51° 30' N	55° 54' W

Locality number	Name of locality	Latitude	Longitude
212	Portland Creek	50° 10' N	57° 36' W
213	Colinet	47° 13' N	53° 33' W
214	St. Joseph's - St. Albans	47° 07' N	53° 31' W
215	St. Anthony	51° 22' N	55° 35' W
216	Pistolet Bay	51° 30' N	55° 45' W
217	Crooked Lake	49° 09' N	56° 03' W
218	Middle Brook Provincial Park - David Smallwood Provincial Park	48° 48' N	54° 13' W
219	Bear Cove, White Bay	49° 51' N	56° 33' W
220	Brown's Cove	49° 38' N	56° 49' W
221	Hare Bay	49° 40' N	54° 18' W
222	Botwood	49° 09' N	55° 21' W
223	Roddickton (10 km N of)	50° 57' N	56° 06' W
224	Frederickton	49° 26' N	54° 21' W
225	Port Albert	49° 33' N	54° 32' W
226	Coachman's Cove	50° 04' N	56° 07' W
227	Isle aux Morts	47° 35' N	58° 58' W
228	St. Pauls	49° 51' N	57° 49' W
229	Englee (8 km N of)	50° 49' N	56° 05' W
230	Newstead (3 km S of)	49° 23' N	54° 51' W
231	Baie Verte	49° 56' N	56° 11' W
232	Southwest Gander River	48° 40' N	55° 03' W
233	North Bay, La Poile Bay	47° 48' N	58° 20' W
234	Connoire Bay	47° 42' N	57° 54' W
235	White Bear River	47° 51' N	57° 17' W
236	Long Harbour River	47° 42' N	54° 55' W
237	Great Rattling Brook	48° 45' N	55° 35' W
238	Port Saunders	50° 39' N	57° 18' W
239	Barr'd Harbour	50° 49' N	57° 04' W
240	Rocky Harbour	49° 36' N	57° 55' W
241	Main Brook	51° 11' N	56° 01' W
242	Caribou Lake	48° 41' N	57° 26' W
243	Rose Blanche	47° 37' N	58° 42' W
244	Lower Cove	48° 32' N	59° 00' W
245	March Point	48° 30' N	59° 08' W
246	Lark Harbour	49° 06' N	58° 22' W
247	Jackson's Cove	49° 41' N	56° 00' W
248	Long Island, Notre Dame Bay	49° 36' N	55° 40' W
249	Carmanville	49° 24' N	54° 18' W
250	Mount Pearl - Newtown	47° 31' N	52° 47' W
251	Manuels - Foxtrap	47° 31' N	52° 55' W
252	Woody Point - Birchy Head - Shoal Brook	49° 30' N	57° 55' W
253	Tilton - Tilton Barrens	47° 37' N	53° 17' W

Locality number	Name of locality	Latitude	Longitude
254	Burlington	49° 45' N	56° 03' W
255	Leading Tickles	49° 30' N	55° 26' W
256	Sally's Cove	49° 44' N	57° 57' W
257	Woodstock Jct.	49° 57' N	56° 54' W
258	Jamestown	48° 22' N	53° 47' W
259	Silver Mountain	49° 40' N	57° 11' W
260	Salmon Cove - Salmon Cove Sands	47° 47' N	53° 10' W
261	Holyrood Pond Provincial Park	46° 53' N	53° 35' W
262	Summerside	48° 59' N	57° 59' W
263	Gilliams	49° 01' N	58° 04' W
264	Belldowns Point	49° 56' N	57° 46' W
265	Colliers	47° 27' N	53° 12' W
266	Searston	47° 49' N	59° 19' W
267	Dicks Brook	49° 30' N	57° 47' W
268	Mason's Brook	48° 44' N	54° 18' W
269	Cobbler's Brook	48° 25' N	54° 03' W
270	East Arm	49° 29' N	57° 45' W
271	Plum Point	51° 05' N	56° 45' W
272	Freshwater, Avalon Peninsula	47° 45' N	53° 13' W
273	Horwood	49° 28' N	54° 31' W
274	Burgeo	47° 37' N	57° 37' W
275	O'Donnels	47° 09' N	53° 35' W
276	Cavendish	47° 43' N	53° 30' W
277	Whiteway	47° 41' N	53° 30' W
278	Heart's Desire	47° 50' N	53° 26' W
279	Heart's Delight	47° 47' N	53° 27' W
280	Dildo	47° 39' N	53° 34' W
281	Deer Arm - Deer Arm Brook	49° 34' N	57° 51' W
282	Little Barachois Valley	48° 22' N	58° 09' W
283	Mollichignick	47° 53' N	59° 05' W
284	Pelleys Bog	48° 32' N	58° 29' W
285	West Lake - West Branch Road	48° 52' N	55° 51' W
286	Bottle Pond Road	48° 36' N	58° 16' W
287	Black River	47° 58' N	54° 10' W
288	Twillick Brook	48° 04' N	55° 35' W
289	North Lake - North Lake Road	49° 13' N	57° 34' W
290	Indian River Provincial Park	49° 30' N	56° 13' W
291	Picadilly Head Provincial Park	48° 36' N	58° 54' W
292	Sheaves Cove	48° 31' N	59° 03' W
293	Abraham's Cove	48° 32' N	58° 54' W
294	Riverhead	46° 59' N	53° 31' W
295	Mud Lake	53° 18' N	60° 15' W
296	Happy Valley	53° 18' N	60° 17' W
297	Otter Creek	53° 22' N	60° 25' W

Locality number	Name of locality	Latitude	Longitude
298	Gull Bridge Mine Road	49° 07' N	56° 07' W
299	Squires Memorial Provincial Park	49° 21' N	57° 10' W
300	Churchill Falls	53° 31' N	64° 01' W
301	Canada Agriculture Exp. Farm	47° 31' N	52° 47' W
302	Jct. TCH and Springdale Road	49° 29' N	56° 13' W
303	Pinchgut Lake - Logging School Road	48° 51' N	57° 58' W
304	Flatwater Pond - Flatwater Pond Provincial Park	49° 46' N	56° 18' W
305	Beothuk Pond Provincial Park	48° 57' N	56° 41' W
306	White Bay Jct.	49° 22' N	56° 51' W
307	Stag Lake	48° 50' N	58° 01' W
308	Goose Bay	53° 18' N	60° 26' W
309	Northwest River, Labrador	53° 32' N	60° 09' W
310	St. Vincents	46° 48' N	53° 38' W
311	Grant's Siding	48° 43' N	54° 08' W
312	Freshwater Pond Provincial Park	47° 07' N	55° 14' W
313	Miguel Lake Road	48° 43' N	55° 32' W
314	Middle Gull Pond - Gushue Pond Provincial Park	47° 22' N	53° 15' W
315	Ocean Pond	47° 26' N	53° 24' W
316	Salmonier Line (8 km S of TCH)	47° 17' N	53° 15' W
317	Mary March Provincial Park	48° 49' N	56° 35' W
318	Kelligrews	47° 28' N	53° 00' W
319	South River	47° 32' N	53° 15' W
320	Bay Roberts	47° 35' N	53° 15' W
321	Spaniard's Bay	47° 36' N	53° 16' W
322	Shellbird Island, Humber River	48° 57' N	57° 53' W
323	Burnt Berry Pond	49° 27' N	56° 11' W
324	Fair Haven Jct.	47° 35' N	53° 49' W
325	Blue Ponds Provincial Park	48° 46' N	58° 06' W
326	Wooddale Nursery	49° 02' N	55° 36' W
327	Portland Creek - Portland Creek Jct.	50° 10' N	57° 37' W
328	Eastern Blue Pond	50° 29' N	57° 03' W
329	Northwest Gander River	48° 43' N	55° 09' W
330	Jumper's Brook	49° 01' N	55° 24' W
331	Parson's Pond Hill	49° 59' N	57° 43' W

APPENDIX II

Names of Localities Cited in the Disease Index

Locality number	Name of locality
501	Georges Brook, Trinity Bay
502	Trout Brook, St. Georges River, Western Newfoundland
503	Corner Brook Pond, Western Newfoundland
504	Humber Arm, Western Newfoundland
505	Hungry Hill, Red Indian Lake
506	Windsor Lake, Eastern Newfoundland
507	Alderburn, Bay of Exploits
508	Windsor, Central Newfoundland
509	Cooks Brook, Western Newfoundland
510	Bihops Falls - Norris Arm Road, Central Newfoundland
511	Sweet Bay, Bonavista Peninsula
512	Summerville, Bonavista Peninsula
513	Stock Cove, Bonavista Peninsula
514	Petley, Random Island
515	Country Pond, Eastern Newfoundland
516	Port au Port Peninsula
517	White Bay
518	Soulis Pond, Central Newfoundland
519	Frenchman's Cove, Western Newfoundland
520	North Side of Gander Lake, Central Newfoundland
521	Bloomfield Jct., Bonavista Peninsula
522	North End of Sandy Lake, Western Newfoundland
523	Pauls Lake, Central Newfoundland
524	Cottrells Cove Road, Bay of Exploits
525	Burgoyne's Cove, Bonavista Peninsula
526	Boot Brook, West of Sandy Lake, Western Newfoundland
527	Sopers, Humber Arm, Western Newfoundland
528	Michaels Harbour, Notre Dame Bay
529	Aspen Brook, Central Newfoundland
530	St. Davids Road, Western Newfoundland
531	Shoal Harbour River, Central Newfoundland
532	Southern Bay, Bonavista Peninsula
533	Little Sandy Point, Southwest of Grand Lake
534	TCH at Hampden Road
535	Harrys Brook, Western Newfoundland
536	Southeast End of Glover Island
537	Charleston, Bonavista Peninsula
538	Rushy Pond, Central Newfoundland
539	Whites Brook Road, Western Newfoundland
540	Harcourt, Bonavista Peninsula
541	Lockleven Road in the Codroy Valley, Western Newfoundland
542	Campbellton - Loon Bay Road, Notre Dame Bay

Locality number	Name of locality
543	Random Island
544	Wetstone Point, Grand Lake
545	Robinson's, Western Newfoundland
546	Notre Dame Bay
547	Terra Nova River
548	Northeast End of Glover Island
549	Little Falls, Humber River
550	Lake Douglas, Central Newfoundland
551	Avondale, Eastern Newfoundland
552	Baie Verte Jct.
553	Northern Harbour, Grand Lake
554	Snug Harbour, Deer Lake
555	West Arm - Point Leamington Road, Notre Dame Bay
556	John's Beach, Humber Arm, Western Newfoundland
557	Glovers Harbour, Notre Dame Bay
558	Lockport, Notre Dame Bay
559	Pine Falls, Lake Ambrose, Central Newfoundland
560	Colliers Ridge, Georges Lake, Western Newfoundland
561	Riverside, White Bay
562	Twin Lakes, Central Newfoundland
563	Charles Brook, Bay of Exploits
564	Bakers Brook, North Shore of Grand Lake
565	Wiley Brook, Red Indian Lake
566	Duntara, Bonavista Peninsula
567	Goodyears Cove, Halls Bay
568	Carter's Road, Stephenville Crossing, Western Newfoundland
569	Gales Valley, Western Newfoundland
570	Valley Brook, Victoria Lake
571	McIsaacs Brook, Western Newfoundland
572	Nichols Brook, Western Newfoundland
573	Bishops Highway, Central Newfoundland
574	Kirkland, Eastern Newfoundland
575	Bantalor Portage
576	Northern Peninsula
577	Baie Verte Peninsula
578	Placentia Bay
579	Trinity Bay
580	Bonavista Peninsula
581	Burin Peninsula
582	Avalon Peninsula
583	Western Newfoundland
584	Central Newfoundland
585	Eastern Newfoundland
586	Avalon District

Locality number	Name of locality
587	Bonavista District
588	Gander District
589	Hermitage District
590	Grand Falls District
591	St. Georges District
592	Humber District
593	White Bay District
594	St. Barbe District
595	Topsail
596	Nippers Harbour Road
597	Old Man's Pond
598	Camp 180 Road
599	Island Pond Road
600	Deadwater Brook
601	Flatwater Pond Road
602	Gros Morne National Park
603	Southern Newfoundland
604	Lady Slipper Road, Western Newfoundland
605	Leading Tickles Road
606	Crooked Feeder
607	Winter Tickle
608	Sandy Harbour River
609	Star Lake
610	Whalen's Pond Road
611	Mill Brook
612	Bay D'Espoir Road (Near Route 360)
613	Sandy Pond Jct.
614	Dominion Lake Area, Labrador
615	George's Point
616	Northwest Gander River
617	Baker's Steady
618	Three Island Rock
619	Eastern Labrador
620	Radio Tower Road, Goose Bay
621	Churchill Road - Churchill Falls Road, Labrador
622	Grand Lake - Grand Lake Brook
623	Humber River - Humber Valley
624	West Branch Road
625	Spring Gulch, Labrador
626	Gull Lake, Labrador
627	Northwest River Road, Labrador
628	Labrador
629	Parker's Pond Road
630	Churchill River

Locality number	Name of locality
631	Portugal Cove - Pouch Cove (on Route 21)
632	Gould's Road (Clarke's Beach to TCH)
633	Main Highway, Baie Verte
634	Burlington Road
635	TCH (Gushue's Pond to Roaches Line)
636	Terra Nova National Park (on TCH)
637	Baie Verte Highway, N of TCH
638	Goose River Road, Labrador
639	Southeast Brook, Northern Peninsula
640	Grand Lake Road, Labrador
641	Grand Lake Road
642	Northwest Gander River Road
643	Lethbridge - Southern Bay (on Route 230)
644	Gander - Gander Bay (on Route 330)
645	Bellburn's - Daniel's Harbour (on Route 430)
646	Goose Arm Road
647	Crescent Lake - Robert's Arm Road

APPENDIX III

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